THE

AMERICAN GAS-LIGHT JOURNAL

AND

MINING REPORTER.

Rooms 27 and 28—No. 15 Nassau Street, corner of Pine Street, New York.

VOL. VI.—No. 3—WHOLE No. 111. NEW YORK, TUESDAY, AUG. 2, 1864. $3 PER ANNUM—IN ADVANCE.

PETROLEUM:

WEST VIRGINIA OIL REGION.

I write to you from one of the most interesting localities in Western Virginia—Petroleum, Ritchie county. This is the centre of the great oil region, and the development of the vast wealth of hidden treasures which lies deep beneath these hills and luxurient valleys, must render these now sparsely settled counties the homes of wealth, which was never dreamed of by the early settlers.

At Grafton we crossed the Valley river, and proceeded out on the North-Western Virginia Railroad to Parkersburg; thence returned to this place, which is twenty-two miles east of the latter place. I am in the midst of the oil region of Western Virginia. I am about half way on the "belt," as oil men call it, from the Ohio river at the mouth of Bull creek, to Burning Springs, in Wirt county. I have examined a portion of the territory with care, and propose to visit and explore the entire region at the earliest practicable day. I have seen enough to convince me that vast, and, perhaps, exhaustless depositories of wealth lie all around me deep-hidden beneath the everlasting hills, where nature in her mysterious laboratory, for countless ages, has distilled these wonderful treasures to illuminate and lubricate the world. Truly, this is the Eldorado. With an influence more potent than the wand of Midas, some people in the Meridian have found themselves converted from comparative poverty into boundless wealth. Initiative operations have only been made. But one well is sunk where a thousand will be. What wealth must all these pour forth! By well directed enterprise, this region of Virginia must become a source of vast profit to those engaged, and of incalculable wealth to the country. The attention of capitalist is rapidly concentrating here. Ten New York companies have commenced purchasing and leasing lands. Parties from Philadelphia have been here, and are preparing to invest heavily. Pittsburgh oil operators are present, and the indications are, that during the present season arrangements will me made to operate on an extensive scale.

The oil region of Virginia is not of recent discovery. In the early settlement of the country, the rude frontiersman and intrepid Indian hnnter rested his weary person at these oil-yielding fountains, bathing his tired and lacerated limbs with the healing fluid. Hughes river, named after the famous borderer, James Hughes, was early known for the oil springs found on its border. But, beyond the days of Indian hunters—far back in pre-historic times, the healing properties of Rock Oil was known. Ancient excavations or "pits," as they are called, have been discovered in great numbers in the oil region of Western Pennsylvania and Virginia. What a world of conjecture is called up by the discovery of these early excavations! Whose work are they? Whence came and whither went, that mysterious race? Do they belong to the race of Mound builders, whose vast and mysterious monumental remains are found everywhere throughout the great valley of the Mississippi, but whose history is as impenetrable as the mystery which envelops their ruins? A great field of research is before the intelligent archæologist and paleontologist. We hope, when this "cruel war is over," or sooner, to see it carefully explored.

Rock oil, as I have already stated, was known to and used by the people from the earliest settlement of the country. Throughout the valley of the Little Kanawha, of which Hughes river is an important tributary, the people have been in the habit of collecting the oil from the surface of streams and springs by means of blankets, and using it for domestic and medicinal purposes.

About 1855, a small quantity was submitted to Professor Silliman for analysis. His report was favorable. The Boston *Transcript* gave the result of his experiments at the time the experiments of Professor Silliman attracted some attention at the time, but the day for oil speculation had not arrived and New Bedford was undisturbed in her oleaginous dream.

Several years since, perhaps ten, an active business was carried on at the first station below this (California), by persons collecting oil from the sand; also from a spring, which was, perhaps, the most productive oil fountain in the United States. An old settler named Lemon resided in the neighborhood, and owned the spring. He made quite a business for years in gather. ing and selling the oil. The average yield, I understand, was above one hundred barrels per annum. It was sold chiefly for medicinal purposes. Quite a trade has grown up in the Western country of bottling and selling this "medicated oil." The process was simple, but ingenious. In boring for salt, the search after saline wealth, was often disappointed by the accumulation of oil in his well. In more than one instance, years ago, parties sinking wells have been compelled to abandon the work in consequence of oil and gas rising to the surface.

These are a few local historical facts, which may be important to know.

The oil region of Western Virginia embraces a very large area. It stretches through Wood, Ritchie, Wirt, and Kanawha counties, where the oil treasure has been found in great abundance. More complete exploration will doubtless determine its existence in Pharants, Doddings, Harrison, Gilmet, and other adjoining counties. Indeed, it will probably be found throughout the bituminous coal measure of the State, but whether in sufficient quantities to work remains to be determined. The geological indications are that it abounds within a zone stretching athwart the three first named counties. I have examined portions of this territory, and am satisfied the laboratories in which the Great Chemist has distilled these priceless treasures, are deep hidden beneath the hills and deep valleys of the region indicated.

The very spot whence I write presents the most remarkable geological feature. All around me are proofs of a violent upheaval. The strata have been broken asunder, and stand, in some places, on each side, at an angle of about fifty degrees. The uplift has perhaps been more virulent here than at any other part of the extensive dislocation. The general inclination is at an angle of about forty degrees. The course is nearly north and south, from the Ohio to the Little Kanawha, in the neighborhood of the celebrated Burning Springs The anticlinal axis is well defined.

My purpose, however, is not to give a geological description of the oil regions in this letter. I may do so again. The present is more discursive—a general sketch of the oil region—modus operandi at the works, &c.

At this point, or rather one and a half miles due north, are the wells of a Wheeling Company—fourteen in active operation. This company, which had commenced operations near Wheeling some five or six years ago, in the distillation of hydrocarbon oil from bituminous shale, had their attention directed hitherward by the discovery of coal, which, it was believed, would render a greater per centage of oil than that which the company were working near Tridelphia, Ohio county, Virginia. About this period, the discovery of oil was made on the Alleghany, in Pennsylvania. A sagacious and practical member of the firm at once concluded that oil could be obtained in the valley of the Little Kanawha by boring, as its existence in springs had been known for years. Accordingly he selected a site on a small stream called Oil Run, purchased an hundred or more acres, and leased a thousand more. Operations were speedily commenced, and oil ho! soon rewarded their efforts. The experiment was a success, and other wells were speedily sunk. The "fever," as the greasy inspiration is popularly called, rapidly spread. Lands went up and wells went down with amazing haste. An "ancient and 'pitch'-like smell" overspread the country. Had the rebellion not then broken out, who can tell but that the valley of the Kanawha may long ere this literally have overflowed with oil. The "fever" yielded under the excessive depletion inflicted by the sword. Speculators skedaddled, guerrillas swarmed around the Burning Springs, and, by way of divertissement, applied the torch to the carburetted hydrogen gas which escapes so freely at all these springs, and by its highly inflammable character has given name to the celebrated Burning Springs of Wirt county. Oil stock went down during the first three years of the war, if the rebellion did not; but guerrillas having tired of their work, and the world needing light and lubrication, operations in the oil region have again been resumed, and the spirit of boring has become manifest. It may be proper here to remark that the wells near this place have not been materially interrupted during the war. Those in Wirt county have suffered the most, the destruction having been general and indiscriminate. A new impetus has been given to the oil business by the discovery of oil in large quantities on Horse Neck and Bull Creek, about fifteen miles from this point toward the Ohio river. Within a few weeks a well has been sunk which yielded, according to various estimates, from three hundred to nine hundred barrels in twenty-four hours? This well has recently been sold at very high figures; but at twice the price paid, and if only yielding half the amount stated, must be a great speculation to the purchasing party. Other successful borings have been made during the present season over a wide, extensive area; but many valuable localities have, doubtless, not yet been touched. This conjecture is correct, unless all geological "signs" fail. A great field for enterprise and fortune is yet unexplored.

I have already stated that the company operating here have fourteen wells yielding oil. They are all in the valley of Oil Run, and within a distance of one mile. They are all worked by a simple contrivance, driven by a single engine. The arrangement is creditable to the ingenuity of Mr. Hamlin, a member and chief manager of the company. The wells have a depth of from seventy-five to two hundred and thirty feet, thus showing that the oil is not confined to a horizontal receptacle, as commonly believed.

The oil from all these wells, with the exception, perhaps, of two or three, is a heavy, dark green fluid, with a specific gravity of about forty degrees. The other wells yield a lighter oil. The former are finely adapted for lubricating purposes, the latter for illuminating use; but as the company have a contract with the Baltimore and Ohio Railroad Company to take all their oil, the products of their several wells are run into a tank

and subjected to a temperature sufficient to cause them to freely mix. They are brought to a specific gravity of about fifty degrees, and barreled for shipment.

The monthly yield from these wells is something over two hundred barrels; but I am satisfied every well might be made to yield five times as much as now produced, by sinking deeper! All experience has shown that the deeper the wells are bored, the greater will be the yield. Twenty wells could be bored here where there is one. There are over five hundred wells on the celebrated Bainanghong district in Birmah, India, which is only an area of three by five miles. For the information of oil treasure seekers, I may mention that the soil in this celebrated district consists of sandy clay, overlaying a thin stratum of slate clay saturated with naphtha, under which is coal. The Petroleum, or "natural tar," in this case, as in the site from which I write, had been distilled from the beds of coal, and condensed at higher points. These wells have yielded four hundred thousand barrels per annum for many years.

The company here are sinking a new well to test the experiment of deep boring. The well has now a depth of over two hundrod and fifty feet, and goes down at the rate of about eight feet per day. The process is simple. A tall derrick is erected over the spot selected for boring. The derrick supports the tackle, &c., for drilling. A small engine, with much of the machinery improvised on the spot, drives the descending chisel, &c. The drilling and paction is a simple contrivance. The drill is about two feet in length, with a blunt flattened end, about twenty-five feet of iron shaft weighing over four hundred pounds. The whole is secured to a stout cable, which, passing over a windlass, is worked by the engine, and controlled by one hand, who is relieved in turn, the two acting alternately as engineer and assistant.

I had forgotten to say that, in commencing operations, an iron tube, in joints of about ten feet in length, is let down into the earth until it rests upon rock. The drill then goes to work, and as it descends into the varied stratification, the tube follows. The drill having been driven to its length—ten feet—is withdrawn, and a sand pump let down to remove the accumulated debris at the bottom of the well. The force pump is a copper tube, about eight feet in length, its diameter slightly less than the well, and supplied at the lower end with a valve opening upward. It brings up the contents of the well very thoroughly, which are examined with much anxiety by parties interested.

The well which I have just been describing has, for several days, been filled with carburetted hydrogen gas (the same with which we illuminate our houses and cities,) and kept up a constant agitation of the water, with a noise which can be heard at some distance. On the withdrawal of the bit, the gas, set free by the drill, escaped with considerable force, ejecting the water to the height of several feet. This, in the parlance of the well sinkers, was called "blowing." "Stand off," said the driller, as he prepared to withdraw the "reamer" (an instrument inserted after the drill has been withdrawn, and before introducing the pump;) "she'll blow like fury." I took his advice, and the water, gas, and oil blew high and wide. The presence of gas is a good feature in a well, particularly when accompanied with a strong bituminous smell.

I will visit, in a few days, a remarkable coal stratum near Cairo, a station fifteen miles east of this point. The coal is represented to be cannel, but the specimen exhibited partakes of the character of consolidated asphalt, or crystalized naptha. It is a black carbonaceous mineral, without stratifications, and nearly free from foreign matter. It yields by distillation about ninety per cent. of pure oil. The stratum partakes of the violent disturbances which characterize this whole region. It is nearly vertical, and has been traced from the base to summit of a considerable hill. A private company are building a railroad from Cairo to the mines.

Near where I write, a similar stratum has been discovered, but it partakes more of the character of bituminous coal.

There are other localities near this, where coal has been discovered, but its quality and quantity has not been determined.

There can be but little doubt when the scientific geologist passes over Western Virginia, he will find it to be one of the most interesting fields in the Mississippi Valley.—*N. Y. World.*

We extract the following from the preliminary Report of the Commissioner of Patents for 1863.

The immense development of petroleum, commonly, but erroneously, called coal oil, beginning practically in August, 1858, in the United States, to 6,000 barrels per day, or 2,190,000 barrels per annum, of which one half is exported and the remainder consumed at home, has directed American inventors, within the last three years, to the construction of a large number of lamps intended specially for its consumption. This will best be seen by reference to the number of applications presented to this office during the last three years as compared with the number for the three next preceding years.

Patents applied for during the year ending—

March 1st,	1859,.....	44
"	1860,.....	72
"	1861,.....	77
		193
March 1st,	1862,.....	130
"	1863,.....	338
Dec. 30,	1863,.....	155

This oil is rich in carbon and hydrogen, but void of oxygen; and from the excess of carbon evolved, one main object to be attained was to command the oxygen of the atmosphere to effect that degree of combustion most productive of illumination, and thus at once economize oil, obtain a pure white flame, and avoid smoke and unpleasant odor. To this end various devices have, within the last three years, been patented.

1. The deflector previously in use has been materially altered in form, and in some lamps two or three deflectors within each other, used in throwing successive currents of air against the flame above each other.

2. The flat wick has been generally adopted, being more simple and exposing a larger surface of flame to the air.

3. The glass chimney previously in use, to shield the flame from currents of air and to increase the draught and consequent quantity of oxygen to the flame, has largely maintained its place. In some models the chimney has been extended below the flame, and shortened above it; in others the deflector and chimney have been united; and in others oval chimneys, either of glass or mica, have been made to correspond with the flat flame.

4. The liability of glass chimneys to break from unequal heat, or accident, as well as their expense and general inconvenience, have made it a desideratum to construct a good hand-lamp without a chimney, for which purpose many patents have been granted, of very various forms, with more or less success. Some have used numerous very small wicks, others very thin wicks; others have made, in effect invented, metallic chimneys below the flame. To keep the oil in the lamp as cool as possible, so as not to throw off more gas than the flame can consume, various non-conductors have been interposed between the burner and the reservoir, such as porcelain, glass, gypsum, wood, gutta percha, &c. Other inventors have effected the same object by isolating, in a great measure, the burner, by resting it on slight metallic points, &c. In a few examples oxygen has been ingeniously and effectively, but rather expensively, supplied to the flame by a revolving fan-wheel propelled by machinery enclosed within the base of the lamp.

5. Other improvements have been introduced, removing the chimney vertically, horizontally, or obliquely, so as conveniently to turn and light the lamp or supply it with oil; others effecting the same objects without removing the chimney at all. Mica and glass deflectors have been used instead of metallic ones, and glass cylinders surrounding the flame and below it, so as to avoid the shadow around the base of the lamp.

6. The necessities and demands of our great railway system have originated improvements in locomotive head-lights, so as to obviate the effect of motion of the engine and counteract strong currents of wind; also, in lanterns, so as to avoid extinguishment by sudden motions, vertically or laterally, and so that the lamp may be easily fastened in or removed from the case and the wick regulated without removal therefrom.

7. Finally, great improvements have been made in the machinery for the manufacture of every part of the lamp, so that for a few cents a good and convenient and even elegant lamp for burning this cheap and highly valuable native oil is now within the reach of every family in the land.

The refining of petroleum is now a large and increasing industry. The inventions in this department relate principally to the construction of stills and condensers. These are now constructed in such a manner as to make the operation of distillation continuous, and so as to separate at one distillation the various products which are derived from petroleum. A new manufacture has grown up during the past year from the waste products or residuum of petroleum. A valuable oil, to be used as a vehicle for paints, has been obtained from what is known as the acid residuum; and a lubricant is made from the tarry residuum of the still. The proper treatment of these residuums is well worth the attention of inventors.

The demands for the different products from petroleum have not kept pace the one with the other. The oil, of medium density, commonly known as illuminating oil, bears the highest price. It is therefore desirable that inventors should direct their attention to the lighter oils, known as carbon spirits, or naptha, and to the very dense and thick products. To some extent the light products are now used by varnish makers and others as substitutes for spirits of turpentine. The heavy and thick oils containing paraffine and similar compounds are used as lubricants. But a sufficient demand for these must be created by the inventors in finding new applications for them, or new modes of transforming them into more useful products. A valuable application of the heavy oils has been found in their use as a substitute for ordinary tanner's oil for dubbing; thus supplying a much felt want.

The large commerce in petroleum has made a demand for barrels and tanks. The liquid hydrocarbons easily leak through the ordinary wooden casks. To make an oil tight cask has therefore become a problem of considerable importance, since the leakage from oil casks not only occasions great loss of oil, but makes the danger from fire very great. Fourteen patents have been issued for oil-tight barrels, besides nearly as many more for tanks and cans. Some of those are for metal casks; others for a common wooden cask or tank, with sheet metal lining; but the larger number aims at producing a composition with which to coat or saturate the staves, to make them impenetrable to oil. The difficulty of finding such a composition is increased by the fact that there is generally a small quantity of water diffused through the oil at the time it is put into the barrel, which gradually collects at the bottom, thus making it necessary to have a composition that is impervious to, and insoluble in, both petroleum and water.

An Oil Lake in Trinidad.—The London *Times*, says:—"There is in Trinidad, only a mile from the coast, a basin of ninety-nine acres, filled with asphalt, yielding seventy gallons of crude oil per ton. There are also springs of asphaltic oil in the neighborhood, and large pitch banks off the shore. It is estimated that the lake is capable of producing three hundred million gallons of oil, and forty or fifty gallons are considered equal to a ton of coal. The *Trinidad Colonist* publishes a *memoire* by Mr. Stollmeyer, of Port of Spain, proposing the use of this liquid fuel for oceanic steam navigation: and he states that he has been, at various times, for these three years, suggesting this employment of a distillate from the pitch lake of Trinidad. To oil a ship would not take above a tenth of the time it takes to coal her, if pipes were employed, and the oil would not take above a fourth of the space occupied by coals. He recommends that it be applied at once as auxiliary to coal, by throwing jets over the burning mass, but contemplates, eventually, upright tubular boilers, the liquid fuel to be supplied as fast as it can be converted into flame. Of course, the North American oil springs are another source of supply.

The total export of Petroleum from the United States for the year 1863, was, crude and refined, 17,056,049 gallons—value, $5,757,618.

PARAFFINE.— Paraffine is always produced by the distillation of organic substances at temperatures below a red heat; bituminous substances yield the largest amount of paraffine; but it may be readily obtained by distilling wax with lime. The oil which comes over solidifies, and the paraffine may be obtained by pressure between folds of bibulous paper. In the distillation of coals, it occurs as one of the last products, concentrating itself in the last portions of the heavy oils, which sometimes become so thick as to solidify below 80°. This constitutes what is commonly called "paraphinized oil," in the language of patent processes.

The paraffine is separated from the oil by cold, and by a centrifugal apparatus, then melted and run into tin moulds, afterwards subjected to cold pressure first, and finally pressed when warm, and treated with 50 per cent. of oil of vitriol, which destroys the coloring matter, and lastly with a potash lye; it is then again melted and run into moulds.

It has great stability—sulphuric acid, chlorine, and nitric acid, below 212°, exert no action upon it. Its property of not being acted on by acids or alkalies, renders it suitable for stoppers for vessels holding such liquids; also for moulds for galvanoplastic purposes, where the metal is not intended to cover, as a substitute for fat now used.

Paraffine melts at 116° (Kane), and by several experiments made with care at 108° It boils at 700°, and then begins to undergo decomposition; it dissolves sparingly in alcohol (4 per cent.), but is very soluble in camphene, and in ether, and may be purified by treatment with these last two liquids. It burns in the air with a clear white flame, but requires a draught or large supply of air to prevent sooting; as a candle material, it requires a glass shade to produce complete combustion. It is a ready solvent of some resins, gutta percha, and caoutchouc, with which it unites in all proportions, and destroys its elastic property. As it contains no oxygen, it might be used for the same uses as benzule for preventing oxidization metals from contact with the air. From not uniting with acids and alkalies it received its name (from *parum affinis*), and this property has been applied to make paraffine paper, for holding caustic alkaline samples. It might also form a tubing substance to transmit caustic gases or vapors. It is too costly, as yet, to supersede white wax, in the manufacture of candles.

THE KANAWHA OIL WELLS.—A late letter from the Kanawha oil region says:—"Oil is worth $15 per barrel at our wells, in bulk. Good territory has gone up out of reach of common people. The wells on Horse Neck are not producing more than one hundred and fifty barrels per day, and all of the Burning Spring region will not exceed that amount. There are any quantity of wells being bored, but no good ones completed. We are boring on territory that we think is good, lying between the Hughes river and Burning Springs, in Wurt county."

GAS.

WATER GAS.

A pamphlet published a number of weeks since by the Manhattan Gas Company, has recently been put into our hands, the greater portion of the contents of which, seem of sufficient interest to justify our extracting largely from it. The first part of it gives an account by Dr. John Torrey and Carl Schultz, Esq., of experiments on the process of Mr. W. H. Gwynne, and the second part, a discussion by Prof. Henry Wurtz of the process of Dr. Wm. Elmer. The first part we give in full, and in a future issue we shall publish the second in abstract.

OFFICE OF THE MANHATTAN GAS LIGHT CO.,
New York, April 12, 1864.

DR. JOHN TORREY:

Dear Sir:—Please give me a full and complete report of the experiments made at Elizabeth, New Jersey, with such suggestions in relation to the proposed methods of making water gas in connection with the use of anthracite coal and zinc, as, in your opinion, are calculated to enable those not familiar with the manufacture of illuminating gas to form a correct judgment of the whole subject.

I wish to publish your reply, and therefore ask that it may be written in popular form.

I am, dear sir, very truly yours,
CHARLES ROOME, *President*.

U. S. ASSAY OFFICE,
New York, April 20, 1864.

COL. CHARLES ROOME,
President of the Manhattan Gas Light Co.:

Dear Sir:—Agreeably to your desire of publishing the details of experiments and observations made at the Elizabeth Gas Works, I herewith submit a report thereon, together with a critical and historical review on the subject of Water Gas, and an Appendix of Patents relating to the subject.

I am, dear sir, very truly yours,
JOHN TORREY.

REPORT ON THE ELIZABETH WATER GAS.
February 24—25, 1864.

Sir:—Two benches of the Elizabeth Gas Works have been altered into so called Water Gas Benches. Each bench consists of two retorts for the carbonization of bituminous coal, and another partitioned retort in which steam is decomposed by anthracite coal, in a manner to be described below. The resulting water gases pass into the carbonizing retort, where they flow over and through the distilling coal, and are claimed to effect a more ready carbonization at a very low temperature, with a corresponding saving of coke, and to convert all the tar and gas carbon into permanent gases, thereby increasing their volume and illuminating power.

The process is based upon a patent of Mr. W. H. Gwynne, of White Plains, N. Y., dated August 4, 1863. "The nature of his invention consists of a new and improved mode of decomposing water for the purpose of applying the gases produced therefrom to heating, lighting and other purposes." "The nature of this invention consists in introducing steam into a retort containing anthracite coal through a coil of pipe (or box with circulating passages cast therein,) and the pipe or box perforated with fine holes, for the purpose of superheating the steam, and passing it in finely divided jets through the anthracite coal in the retort; said retort, circulating pipe and coal to be heated to redness during the time the gases are being made, thereby producing gas more cheaply and speedily than it has been done by other methods."

It will be well to premise that the patents and methods of decomposing water are so old and numerous that the patent of Mr. Gwynne will not stand in the way of any one who wishes to make water gas. Of the host of patents enumerated in the Appendix* we only point out Manby's (1839,) who passes steam through a highly heated pipe into a retort filled with anthracite, and Gillard's, (1858) who passes steam through perforated tubes into heated charcoal or any other suitable material.

In order to test the practical bearings of the Elizabeth improvement, it was agreed to weigh the coal, to measure the coke made and used for carbonization, to measure the tar and to ascertain the quantity and quality of the gas. [The experiments were conducted under the supervision of Carl Schultz.]

The coal was half cannel and half caking, the charges weighed 125 pounds, and were drawn every two and a-half hours, thus increasing the firemen's labor 100 per cent.

1st chge.	250	lbs.	coal	(1 bench)	produced	1,280	c. ft gas.
2d "	500	"	"	(2 benches)	"	1,910	"
3d "	500	"	"	"	"	900	"
4th "	500	"	"	"	"	920	"
5th "	500	"	"	"	"	1,360	"
6th "	500	"	"	"	"	1,700	"

or 2,750 pounds of coal produced 8,070 cubic feet of gas, which is at the rate of 6,570 cubic feet per ton. The "great uniformity" in the yield of gas is very striking. It was caused by a desire to save coke. Mr. Joseph Battin, of Newark, under whose superintendence the alterations of the Elizabeth Gas Works were made, also admitted that the second bench, though needed every day, did not yield so good results as the first one, nor had the second bench been put in working order when other experiments were tried, about a month later; and it probably will be found that steam, which is intended to decompose anthracite coal, if forced at first through red hot iron tubes and boxes, will oxydize them at Elizabeth as well as elsewhere. We would be obliged to know the expense of water retorts, with boxes and connections, used up at Elizabeth, as, at the present price of castings, they cannot be a very cheap source of producing hydrogen (" with little carbonic oxide.")

It was agreed to work only the "good" bench after supplying the evening's consumption.

7th chge.	250	lbs.	coal	(1 bench)	produced	1,160	c.ft. gas
8th "	250	"	"	"	"	1,140	"
9th "	250	"	"	"	"	1,150	"
10th "	250	"	"	"	"	1,240	"
Or,	1,000	lbs.	of coal		produced	4,690	c.ft. of gas

Or at the rate of 10,500 cubic feet per ton of 2,240 pounds, half cannel and half caking.

The illuminating power of the gas was equal to 18 sperm candles; the photometric test being made in a very small room, with candle and Argand burner close to the wall. Observations were made every half minute, as the gas was only imperfectly regulated.

10,500 cubic feet of 18 candle gas per ton of half cannel and half caking, with 125 pound charges, were not considered sufficiently encouraging to justify any examination of the gas in regard to its composition and permanency.

The good bench yielded 54 bushels (using their bushel measure) of coke, and consumed 36, showing a consumption of coke of 66⅔ per cent.

The results of these experiments were little calculated to impress gas people with the economical features of the "new process;" and the desire being expressed to have another trial instituted, a second series of experiments was made from March 16th to March 19th.

Only the "good" bench was now in operation, and was fired up to a strong working heat, to attain which nearly all the coke was used. The first claim, then, of producing gas at a very low temperature, with a corresponding saving of coke, had been already abandoned. The charges were again of 125 pounds, half cannel and half caking. The average time of working off a charge, including the delays of cleaning the stand pipes, was three hours. The stand pipe being connected with the retort by a "superheating chamber," had to be cleaned from above—an improvement which is not yet patented. Twenty-five charges of 250 pounds, (one bench, two retorts) or 6,250 pounds of coal, produced 37,230 cubic feet of gas, which is equal to 5.95 cubic feet per pound and 13,328 cubic feet per ton of 2,240 pounds. The illuminating power of the gas was 15.01 standard candles on March 17th, and 15.60 candles on March 19th, or 15,30 candles on an average. The value of a gas being in direct proportion to its illuminating power, we have to reduce it to 18 candle gas (which quality is readily obtained by the common process) in order to get a proper comparison with the February results.

13,328 cubic feet of 15.30 candle gas will be found equal in illuminating power to 11,328 cubic feet of 18 candle gas, thus showing a gain of 828 cubic feet of gas over the results of February. Let us see how this gain was obtained.

The coke produced by the bench measured 143 bushels, of which 129 bushels, or 90.2 per cent., were used for carbonization. This is an enormous consumption of coke. Even persons not familiar with the manufacture of illuminating gas know the great importance of coke to gas companies. The sale of surplus coke is, indeed, one of their principal sources of profit. How much can the dividends of the Elizabeth Gas Works be swelled by *their* revenue from coke? One bench, if worked at the rate of these experiments, produces about enough gas to light the town, and yields 14 bushels of surplus coke in three days, or about 47 chaldrons per annum, which, at the present price of $4, amounts up to the snug sum of $188! This large consumption of coke has been also the death blow to all water-gas schemes in England, where fuel is considerably cheaper than in this country; and with such experience before their eyes, it is astonishing that men can thrust old and exploded schemes upon the public.

*The Appendix referred to, which was compiled by Prof. Wurtz, includes abstracts of the specifications of sixty of the most important patents relating to water gas, down from the earliest times, forming a condensed historical review. It seems a document of value and worthy of preservation, and we contemplate publishing it in a future number.

The anthracite coal, which was put in the water retort, weighed 728 pounds, leaving a residuum, after three days working, of 485 pounds, thus showing a consumption of 243 pounds of carbon, or about 260 pounds of anthracite coal, which corresponds to 93 pounds per ton of gas coal. The anthracite coal, however, becoming unfit for use before its entire carbon is burnt out, the quantity required per ton of gas coal, should be placed at 100 pounds.

There were no facilities to collect the *tar* at the condenser, where the gas, after being cooled, would deposit its liquid portion; still arrangements were made to collect it at the hydraulic main, in order to ascertain the correctness of Messrs. Battin and Gwynne's assertion—that the water gas, in some mysterious manner, converted all the tar into permanent gases. The tar measured 27 gallons, or 9.6 gallons per ton.

Without counting the great waste of iron retorts, which necessarily follows in the wake of the water gas process, nor the doubled amount of firemen's labor, the direct cost of materials necessary to produce 11,328 cubic feet of 18 candle gas, according to the above experiments, will be as follows:

Half a ton of Scotch Cannel.

Half a ton of New Castle Coal.

90.2 per cent of the coke made, (with 9.8 per cent. to sell,) and 100 pounds of anthracite coal.

From these data we leave it to gas engineers to draw their own conclusions, according to the experience of their works; but for the Manhattan Gas Light Company, we beg to state that such expense would very soon throw their shares into the market, with few buyers.

The present process of gas manufacture is a beautiful, safe and simple realization of profound scientific research. In gas coal, nature has placed the constituents necessary to yield all the advantages which the application of water gas may possess. Water is one of the products of carbonization, but that fact probably has been overlooked by some of our engineers, because it is called in hand-books Ammoniacal Liquor. Why should that water, which is in excess, and which is produced from the very coal itself, in the form of steam or even superheated steam, if you please, in the presence of tar vapors, and finely divided carbon, and which is in the "nascent" state, if ever anything was so—why should it not—without any additional expense—be decomposed in the same manner as when you pass it into a separate retort, over red hot charcoal, or coke, or anthracite coal, or iron turnings, or even zinc?

Experiments made in your laboratory, some years ago, with American caking coal alone, on a working scale, and which yielded over 12,000 cubic feet of 15 candle gas per ton, indicate that possible improvements in gas manufacture lie not in the direction of water gas.

Your most obd't servants,

JOHN TORREY,
CARL SCHULTS.

COL. CHARLES ROOME, President, &c.

POSTSCRIPT.

Since writing the above report a pamphlet has been handed to us under the title: "The Anthracite Gas Lighting and Heating Company of New York." As great importance is attached in it to the heating qualities of the new gas, we beg to state that the heating power of illuminating gas is nearly proportioned to its illuminating power, both depending upon the amount of carbon and hydrogen contained in the gas, and that the heat evolved by a gas flame which burns without smoke cannot be increased by burning the gas in any other way. It is also a popular error to expect from cheap water gas the same amount of heat as from good coal gas. The great heat evolved by a certain weight of hydrogen is apt to mislead people, because hydrogen is very light and has to be measured.

1 c. ft. Hydrogen	will heat	2.22	lbs.	water	fm. 32° F. to	212° F.
1 " Carbonic Oxide	"	2.16	"	"	do.	do.
1 " Marsh Gas	"	6.17	"	"	do.	do.
1 " Olefiant Gas	"	10.74	"	"	do.	do.

These figures show that New York City Gas has a heating power at least two and a half times as great as anthracite water gas, and that the latter, in order to give to the consumer the same value as the City Companies, should be sold at $1 per 1000 cubic feet. Neither may it be amiss to mention, that the gas cooking and heating apparatuses in favor with the public, all of which are based upon an admixture of atmospheric air, could not be used for water gas, as the latter would not *burn* but simply *explode*.

One omission in the report of the President and Directors of the Elizabeth Gas Company is, perhaps, accidental. They state: "The coke made is of good quality, and about 45 bushels to the ton of 2,000 pounds of coal." Why did they not add that 90.2 per cent, of that *good* coke was used up for carbonization, and that not quite 10 per cent. was left for sale?

[We shall continue the publication of this paper in our next issue.]

THE PORTLAND GAS LIGHT COMPANY.—The annual meeting of the stockholders of the above company, was held at their rooms on Wednesday, June 30th, at 3 P. M. The old board of Directors were re-elected by a unanimous vote. The board also re-elected Edward H. Davels, Esq., President, and Hon. Jas. T. McCobb, Treasurer.

The following is the Report of the Directors to the stockholders, at their annual meeting, July 20th, 1864:

The Directors have the pleasure to lay before the stockholders a statement of the affairs of the Company, showing an increase in the business and the receipts of the past year that has enabled them to make the usual dividends, notwithstanding the largely increased expenses of the Company.

It is well known that the price of coal, as well as of all the materials used in the renewal of the works, and the cost of labor, have materially advanced within the past two years, while the price of our gas has remained the same. That the stockholders have realized a reasonable profit from their business under these circumstances is owing principally to the large purchases of coal made in 1862, and to the construction of the new benches of retorts in that and the following year.—With these advantages, and with the increase in consumption and in receipts from sales of coke and tar, it has not been necessary heretofore to raise the price of gas, although the cost of labor has been constantly increasing, and portions of the coal and other materials used have been purchased during the past year at greatly increased prices.

The Directors have been extremely desirous to avoid making an advance in the price of gas, and have postponed it as long as it could be done, in the hope of a favorable change in the price of freights and of foreign exchange; but the actual cost of the coal we are now using, and of that ordered and on the way, together with the other increased expenses mentioned, preclude any expectation of the Company's being able to furnish gas for the coming year without a considerable advance in the price.

No additions or changes of any consequence have been made at the works the past year. A lot of land has been purchased on Beach street, 74 feet front and about 100 feet deep, for a reservoir, together with the right to lay water pipe thence to the works; and a reservoir has been constructed on it, which, it is expected, will give such an additional supply of water as will be required in consequence of the discontinuance of the canal in front of the works. The whole expense is about $3000.

The present number of consumers of our gas is 1987 a gain of 130 during the year ending June 30th. Six additional street lanterns have been put up, making the whole number 303.

The total consumption of gas for the year is 24,681,750 feet, being about 3,000,000 feet more than last year.

Of street mains, 2081 feet have been laid, and 715 feet of three-inch iron water pipe.

The whole amount received from sales for the year, is $81,730 27, being an increase of $13,114 57 over the receipts of the previous year.

The report of the Treasurer will show more particularly the state of the Company's finances.

By order of the Directors,

EDWARD H. DAVEIS, President.

PORTSMOUTH N. H. GAS COMPANY.—This Company has advanced the price of Gas from $4,25 to $5,10, twelve-and-a-half per cent. off for prompt pay. They say the price of coal formerly with them was $4,75, while at present they are paying $13,75 per ton.

MINING.

THE MECHANICAL AND CHEMICAL TREATMENT OF GOLD AND OTHER METALS.

A LETTER ADDRESSED TO PROF. B. SILLIMAN, JR., FROM JAMES D. WHELPLEY, ESQ.

Agreeably to your request, I send you herewith a few memoranda in explanation of our new process for preparing quartzose ores of gold for amalgamation.

This process, so far as I am aware, together with all the machinery employed in it, was invented and constructed by Col. J. J. Storer and myself.

Our researches in this direction began in the spring of 1860, in Philadelphia. We experimented for several months upon a small scale, testing most of the then known processes for reduction and desulphurization of ores. It then appeared to us that processes requiring long periods of time, such as are employed by skillful chemists in the laboratory, could not be applied to large mining operations, where masses of several tons have to be treated at one operation.

A few grains of sulphurets of iron or copper heated to whiteness in a platinum capsule will be thoroughly desulphurized, but a mass of ore weighing several thousands of pounds cannot be handled in this manner. The ore fuses in this manner, taking the form of slag, and holds the sulphur confined in its substance.

If, on the other hand, the finely pulverized ore be spread thinly over a hearth fourteen feet in length and eight or teen feet in diameter, with free access of air, and the heat either radiated from the roof or passing up through the hearth of the furnace, a very thorough desulphurization may be effected, by constant turning and exposure of fresh surfaces, taking care that the temperature does not exceed a cherry-red heat.

A large access of atmospheric air is necessary for the management of this process, and it is aided by the addition of chlorid of sodium, and other reducents. Though perfect in the end, it is exceedingly expensive and tedious, because of the care required in regulating temperature and handling of the material.

The results of the experiments with this last process were, however, very valuable to us. We discovered that the first condition of thorough desulphurization was the reduction of the ores and sulphurets to an impalpable powder. The reason of this is evident; viz.: that the effect of heat upon a particle increases inversely as the square of its diameter.

Microscopic atoms are readily acted upon by combined air and moisture at a cherry-red heat. Pieces of the size of mustard seed will resist the action of the best managed furnace for hours, and the difficulty increases with the size of the particles directly as the squares of their diameters.

A theorotically perfect process, therefore requires:

1st. That every particle shall be microscopically small—in the condition of fine, floating dust.

2d. That the particles do not touch each other while hot.

3d. That when metallic grains, as of gold or copper, have to be separated from the ore, the contact of water with the heated particles is necessary.

We constructed a furnace in which finely pulverized ore-dust was floated in a current of hot air and flame, passing down through a flue leading from a hard-coal fire, at an angle of about 45°, and then resting upon a horizontal hearth or sole.*

We discovered at this time that moisture or the vapor of water in large quantities materially aided the process of desulphurization in free air, and we constructed and applied a steam apparatus by which a volume of steam was made to pass down the incline flue with the ore-dust, the atmosphere, and the products of combustion.

At this point we encountered several serious difficulties. The inside of the inclined flue became lined with stalactoid masses of semi-fused ores, and the sole of the furnace caked and covered with the same. When a certain quantity of burnt ore had accumulated on the hearth, a trap was opened, and the heated mass

* This furnace was built and worked in Charlestown (Mass.), in May, June and July, 1861.—J. D. W.

pushed through into a water-bath. The agglutinated masses, on being withdrawn from the bath, were re-ground, and passed a second time through the furnace.

A sufficiency of atmospheric air could not be applied through the furnace doors, and a very large percentage of the ores escaped through the chimney into the open air.

The last of these difficulties was overcome by placing a powerful fan wheel of copper (which served also as a water or spray wheel) in the chimney itself, or in a chamber of it, and by carrying the horizontal flue some seventy-five feet beyond the wheel.

The steam from the furnace and the spray from this wheel, working over a pool of water which formed the floor of a horizontal flue, effectually wetted down and saved the flying dust of ore.

The brick floor or sole of the furnace was abandoned, and a water floor substituted. Over one end of this pool or water-hearth a perpendicular flue was erected, from twelve to fifteen feet in height above the surface of the water.

The flames of four fires were poured into the top of this flue by the effect of two fan wheels: the first, the copper spray wheel already spoken of; the other, an auxiliary fan blower, sending air into all the fire-boxes. The top of the furnace was left open, and a column of air bearing pulverized ore, driven directly from the pulverizing mills, down through the centre of the perpendicular flue.

The operation of this machinery balanced and regulated the force of the draft so well, that while ore-dust was driven in at the rate of 1,200 pounds an hour, carrying with it an excess of atmospheric air, if a side door of the descending flue were opened, a feather would float in the opening without being blown either way.

We then discovered that the immediate quenching of the fused particles of ore, by the water in the pool and in the chamber beyond, was essential to a thorough separation of the metals. The heated particles on touching the surface of the water are exploded into still minuter fragments, a degree of fineness unattained by any other means. The entire apparatus is constructed with a view to this result.

The water lining the bottom of the flues is a circulation completed by an outside canal. The water thrown up from the copper dash wheel, returning circuitously, falls back into the furnace pool. This water, after some time working of the furnace, is of course charged with sulphates of iron, copper and other metals. The insoluble metal falls to the bottom with the sediment, which is composed chiefly of silicia and iron. In this sediment the gold will be found ready for washing and amalgamation.

The sediment is drawn out by the workmen as fast as it accumulates, through the submerged arches on which the brick flues or water chambers are established.

The condition of the sediment is that of a smooth plasma without grit and coarseness of grain. Using only floating dust, ten tons can be worked in ten hours with these results, in a furnace of the size indicated. More extensive machinery would give larger returns.

We built our flues and water beds under the furnace and also under the horizontal brick archway leading therefrom to the spray-wheel, of common brick, thickly covered with ordinary hydraulic cement. We found this a very good lining for the descending flue or "drop" The spray chamber beyond the dash wheel was built of wood, over a brick and wooden water channel seventy-five feet long, six feet wide, from twenty to thirty feet high. This was filled with vapor of water and sulphurous acid from the furnace pools, which made a fine rain, carrying down any minute ore-dust which might escape the action of the dash wheel, also condensing large quantities of sulphuric acid from the sulphurets.

The gold ores most free from sulphurets are easily worked. When the sulphuret is in excess, the supply air and moisture must be proportionately large.

In regard to fuel, the finer the ore-dust before burning, the more economical the process.

In places where wood alone is accessible for fuel, the fire-boxes should be from twenty-nine to thirty inches deep below the fire-bridges; eight inches for coal.

Crushing Machinery.—For crushing gold ores previous to fine grinding, any ordinary machinery may be employed that will reduce them to pea or gravel-size, as they must not be larger than this before entering the pulverizer.

The crushing mill used by us is a patented invention of my own. It consists of a very heavy and solid bar of wrought iron, revolving in the bottom of a cast iron tub as close as possible to the sides and bottom of the tub.

This bar carries at either extremity a hardened steel or chilled-iron plate, with a cutting edge welded to a soft iron back to prevent rupture.

The sides of the tub are pierced with holes from an inch to half an inch in diameter, forming a coarse seive.

Two of these bars may be used crossed, working four cutters, held together by a cast iron centre piece of great strength and solidity, through which an upright shaft passes, furnished with a step and a pulley. The speed of these cutters is a little more than 10,000 feet a minute. The broken pieces of quartz are thrown out of the holes in the side of the tub at the rate of five tons an hour.

Pulverizing Machinery.—The pulverizing of the crushed ore is performed by flat plates of thin iron faced with chilled iron, attached to radiating arms; somewhat like the paddles of a steamboat wheel. These revolve inside of a cast iron drum, as close as possible to the sides and very near its circumference. A horizontal shaft passes through the centre of the drum.

The material, gravel size, is poured in on one side at the axis by an automatic hopper, which measures the quantity.

A powerful draft of air, forced through the machine by a fan blower, forming an essential part of the apparatus, draws out the dust through a hole on the opposite centre of the drum, where the shaft also passes.

The dust is then carried by this fan blower and driven into the top of the furnace. The minimum rate of delivery for a mill of ordinary size is 1,500 pounds an hour.

Of this last machine I cannot give you a more minute account, as its successful operation depends upon interior details, obtained by long and costly experiment. The maximum rate of production we have not yet ascertained.

All the new and important features have been patented by Col. J. J. Storer and myself.

As soon as possible, I will furnish you with working plans of the furnaces built and worked by us. We have ground the hardest copper ores of Vermont and the quartz of Nova Scotia in our pulverizing mills. I know of none more difficult of reduction.—*American Journal of Science and Arts.*

The Plattner [Chlorine] Process to be Introduced into the Colorado Mines.—The Black Hawk (Colorado) *Mining Journal* says, that Messrs. Keith, Moller & Co. have decided to throw aside the Frieberg pans and substitute therefor the Plattner (Chlorine) Process for working the sulphuret ores, which abound to the exclusion of almost everything else in the mine belonging to that company, and indeed in most of the mines of Pike's Peak. This company, it will be recollected, is the one which has so successfully introduced a new process, known as the "Keith's Process," by means of driving, with a blast of air and flame, the finely divided particles of ore through a long furnace, the particles of ore becoming desulphurized in their passage.

The chlorine process has been successfully employed in the Reichenstein mines, in Europe, for the last fifteen years, where it is said the ores do not exceed an average yield of $8 60 per ton. Mr. Maynard, a professional assayer of New York, has recently returned from a tour of observation in the European mines, and reports that this process is coming into general use in the mines of Saxony, Selesia, and Bohemia. He further intimates that it is somewhat singular that the process has not been "already introduced in the quartz mining sections of America."

To this it may be replied, that there is but a very small portion of the ores of California to which the principle is at all applicable. The sulphurets alone can be worked by it. It is applicable only where the gold is exceedingly fine, as it generally is in all sulphurets. The gold, as it usually occurs in quartz, is too coarse to be taken up by chlorine gas, and would, of course, be left behind in the mass. Mr. Deetken, whose works are located on the San Bruno road, some three miles west of Montgomery street, in this city, is, we believe, the only man who has yet introduced the process into this State. He first employed it in Nevada county, removing from thence to this city some three years ago.

Chlorine, the chief agent employed in this process, is a peculiar pungent gas, the same which is so generally used in bleaching operations, and is manufactured from salt, sulphuric acid and oxide of magnese, and can be used economically for separating gold from its ores only where the above materials can be obtained in great abundance and at cheap rates. The process is applicable to gold only. It is said that the materials for the manufacture of the gas are abundant in the neighborhood of Pike's Peak. The sulphurets submitted to this process must first be finely pulverized, then desulphurized, and afterwards submitted to the action of the chlorine, in close tanks, through the bottom of which the chlorine is introduced by means of pipes leading from the generator. The gold contained in the mass (which must be very fine) is taken up by the chlorine after being submitted to its action for a few hours. The covers of the vats are then removed, water let in upon the top of the mass, and the chlorine and gold leached out, precisely as lye is leached from ashes. From the solution thus obtained the gold is readily precipitated by a simple chemical process.

The process is a very interesting and thorough one, but can never be made generally applicable, for reasons given above. There is little danger that it will work any important revolution in the quartz milling business, as inferred by the Colorado *Mining Journal.*—*San Francisco Mining Press.*

Silver and Copper in Utah.—The *Salt Lake Vedette* says: We are informed that assays of rock brought from Beaver county, in this territory, have yielded from ten to twenty per cent. of silver, and twenty-five per cent. of copper. This result has been obtained from croppings, and establishes the fact that gold, silver, and copper can be found in the mountains of Utah. The hardy and enterprising miners of the Pacific slope will, ere twelve months pass away, place this territory beside Nevada as regards mineral wealth.

A New Mining Process.—The San Francisco *Mining Press* says: The Virginia papers state that a new process, known as the "Rivot Process," for working minerals is about to be put into practical operation in that city some time during next month. It claims to be able to work any kind of mineral and silver and gold with but a trifling, if, any loss, and at about the same expense as is incurred now. The process has been patented in the United States, Mexico, Peru, Chili, Bolivia, Spain, Russia, and the Province of Mendoza. Rock paying $10 per ton in silver could we worked to advantage with this process in Europe. We have heard considerable talk about the process, in this city, for some months past, and shall be happy to give the public any results which may be obtained from its practical application. It is certainly a great desideratum to be able to work a silver ore, profitably, that will not return a gross yield of over $20 or $25. Such a result would give large value to hundreds of veins that are now worthless. Perhaps it may not be too much to expect, in these times of improvement and invention. We prefer to speak encouragingly of all experimental operations; as by throwing discouragements in the way we *may* put far off important improvements, which might otherwise be brought to benefit the present day and generation.

River Mining.—The river mines th roughout the State of California, all promise well for a longer summer's work than they have had for some years. On Feather river, we hear that prospectors are pitching in lively on the bars and beds with favorable indications. Sand packers are numerous, and appear to labor willingly. The river itself is lower than it has been for several years and that Scott river is receding very fast, and the miners will soon be in the stream, for the longest summer's work, probably, that has ever been known on Scott river, resulting from the unusually mild winter just passed.

A Pan for Dry Crushing.—Mr. Faucher has also applied, through the agency connected with this office, for letters patent for a mining pan of his invention, which is designed to grind the quartz dry. This pan is constructed so as to work very much upon the principle of the ordinary mill stone—the upper and lower portions (corresponding to the upper and nether millstones) are cast very heavy. Strips of wrought iron are placed into the mould before casting, so as to be imbedded into the face of the grinding surface. The quartz is fed to the machine after being reduced by previous stamping to about the size of peas. The two grinding surfaces are held to their places by set screws above and below. The machine is so constructed as to allow of the outer surfaces of both the upper and lower grinding plates to be constantly submerged in a constantly changing bath of cold water, to prevent the plates from becoming over-heated when in operation. Mr. Faucher claims that he can reduce rock to the desired fineness more effectively, and with less cost, with this machine, than by any other machine in use, either wet or dry, and also preserve the universally acknowledged advantages of the "dry process."—*San Francisco Mining Press.*

New Amalgamator.—The San Francisco *Mining Journal* says: Mr. M. Disney has just put in operation an amalgamator, constructed on quite a novel principle. It consists of a horizontal cylinder, with movable dies on the lower half of its circumference, and shoes to correspond, attached by arms to a horizontal shaft revolving within the cylinder. This mode of constructing and operating an amalgator must keep the pulp thoroughly mixed, while the expenditure of power is most economically applied. The machine is simple, light, and inexpensive—all most important considerations. It may be seen in the rear of the Vulcan Machine Shop, on Sutter street, between Sansome and Montgomery. The inventors are quite sanguine of its success.

Coal in Use.—The coal found some time since in Lyon county, (N. T.), and about nine miles from Dayton, improves as the mine is worked. The stratum is nine feet thick at the present depth of the shaft, some thirty-five feet. It has been tried in a blacksmith's forge and is said to be superior to charcoal, answering all the purposes of welding and working iron. It will probably be brought into general use. The several companies holding locations on the tract, have consolidated, and the claims will hereafter be operated under joint ownership.

Greenbacks.—The Austin *Reveille* says, that several superintendents of mines in that vicinity have come to an agreement with their workmen to pay in greenbacks, raising the rates of wages to make up for the difference between legal tenders and gold currency. A company in Humboldt have adopted in their by-laws a provision that stockholders may pay their assessments in greenbacks.

The San Francisco *Mining Press*, of the 18th ult, says:—The Yuba Company have recently remitted seventy-eight ounces of gold, the result of six and three-quarter days working of rock from their ledge, worked at the Pennsylvania mill, Brown's Valley Yuba county. This is the third report of a similar character made by this company during the past few months.

Dorchester and St. Mary's Copper Mines.—From the subjoined paragraphs, copied from the Houghton *Mining Gazette* of July 9, it will be perceived that the openings on Dorchester "continue to display great richness." All accounts from Lake Superior, both by local newspaper and private correspondence, concur in representing Dorchester as a mine of rare promise and unsurpassed prospect. The *Mining Gazette* says:

"*Dorchester.*—The openings being made on the Albany and Boston conglomerate on the Dorchester mine, continue to display great richness. A shaft will soon commence going down on this famous belt when we may expect good returns from the work. A crosscut has just been put down to the face of the Pewabic lode, and the character of the vein matter exposed thus far is quite healthy and good. As soon as a drain can be brought up, the last named deposit will be opened upon. A good boarding-house is now completed which will accommodate about twenty-five miners. There is also in state of construction a dwelling-house and office for the resident officer of the mine, Capt. P. Tracey.

"*St. Mary's*—A small mass of copper weighing about 160 pounds was taken out of the epidote on the St. Mary's this week. This copper bearing belt is showing a degree of richness sufficient to warrant the adjoining company—Dorchester—commencing operations on the same belt at once"

WATER.

DETROIT WATER WORKS.

Office of Water Works, Detroit, June 29, 1864.

To the Board of Water Commissioners of the City of Detroit:

Gentlemen—The annual assessments of rates to be charged for water for the year, commencing July 1, 1864, have been made, and a recapitulation of the same, together with statistical facts collected while canvassing the city, are herewith respectfully submitted.

The aggregate amount of rates assessed, is eighty thousand one hundred and twenty-four dollars, being an increase of three thousand one hundred and twenty-one dollars over last year.

The number of families now supplied with water from the works is seven thousand nine hundred and ninety-three, being an increase over last year of two hundred and ninety-four families, and an increase within the past five years of eleven hundred and ninety-nine.

The number of families in the city not supplied with water from the works, most of whom reside in districts through which distributing pipes are not yet extended, is sixteen hundred and thirty-nine.

The whole number of families keeping house in the city, is nine thousand six hundred and thirty-two, being an increase over last year of two hundred and forty four families, and an increase within the past five years of eight hundred and sixty-five.

The number of unoccupied buildings in the city at the time the canvas was made, was less than any previous year, being one dwelling, four stores, one tavern, one brewery and one soap factory; total eight. The number of buildings constructing at the same time, was as follows: Eighteen brick and eighty wood dwellings; total, ninety-eight dwellings: five brick stores, one brick church, one brick chair factory, one brick wooden ware factory, one brick match factory, one brick tobacco warehouse, one brick mechanic shop, one brick Board of Trade hall, one wood storehouse and one wood hospital. Total, 112 buildings; valuation, $380,000.

Respectfully submitted,

Rob't E. Roberts, Secretary.

San Francisco Water Works Company.—This company has filed a certificate showing that at a late meeting of the stockholders the capital stock was increased from $1,500,000 to $2,000,000. The certificate states that the amount of the capital stock of said corporation actually paid in is $1,373,565 40; the whole amount of debts and liabilities of the Company is $9,750 which is almost entirely composed of liabilities upon contracts not yet executed, and the cash assets on hand, $20,664-49. The first dividend declared, amounts to one-half of one per cent. on the whole capital stock, or $10,000.

The Use of Water with Fuel.—There is no absolute increase of heat from the decomposition of water and the burning of its elements. Such a problem would be very much akin to that of perpetual motion. A very important economy doubtless arises from the mechanical action of water or steam on coal or other fuel, but no positive increase of caloric.

A furnace has been in use for some time at Newark, N. J., constructed on the following principle: The air enters through hollow grate-bars, and issuing from holes in their lower sides passes up between them to the fire. This circulation of air prevents the bars from melting or burning. Wet tan bark, dripping with water, is shoveled into the furnace, and an intense heat is the result. Whenever the furnace doors are open the interior of the furnace is filled with smoke, but as soon as the doors are closed the smoke disappears, and a passer-by would not know from looking at the chimney that there was any fire in the establishment.

At the Providence gas works, superheated steam is used in the furnaces employed for heating the retorts, and the saving of fuel is said to be fifty per cent. Twice the amount of coke is produced when steam is used in the furnaces, as when steam is not thus employed. The waste heat from the furnace passes through an upright boiler in the rear of the retorts, and the steam is brought forward through a pipe which is coiled around the fire-box, five jets above the grate and two below, on each side. The heat in the furnace is so intense that they are obliged to use clay retorts for making gas; iron would soon burn out.

A New Water Wheel.—*A California Invention.*—Mr. B. Fauchery, of Nevada county, has recently invented and put into practical operation an hydraulic wheel, of a simple and compact construction, yet most effective in operation. Mr. F. has put one of these wheels into operation at the new quartz mill recently erected by Mr. L. E. Charonett, about a mile and a half southeast from the town of Nevada. It is known there as the "French wheel." The editor of the Nevada *Gazette*, who recently examined it, says: "It is about eight inches in diameter and a foot in length, of cast iron, and in pattern something like a double turbine wheel. It is enclosed in a cast-iron case not much bigger than a large sized stove pipe hat. The whole affair, though made of iron, could be picked up and carried off by a man of moderate strength, were it not that Charronatt has fastened it securely to a couple of heavy timbers. A head of from fifty to sixty inches of water, with a fall of 125 feet, turned into this little insignificant looking affair through a pipe, converts it into a 30-horse power engine, which performs steadily and smoothly, and with wonderful simplicity." The inventor had previously put up one of these wheels for the Fellowes Company, at German Bar, on the Yuba river.

A Practical Invention.—We have been shown a new-fangled rat-trap, invented by a citizen of Sacramento, which beats anything we ever saw or heard of for exterminating long-tailed vermin. The trap shown us is constructed of wire, and in length is about twenty inches, and is divided into three separate rooms. The first room is the reception room, in which the alluring bait is suspended, but never disturbed, for his ratship has something else to think of. The scent of the cheese allures the rat into the front door, and before his caudal appendage is fairly inside, his weight upon a false floor in the bottom of the trap causes a lever or beam on the top of the cage to tilt, and in a trice the front door is closed, and by the same action, that leading to room No. 2 is opened. Having entered the next room, he there steps upon a false floor, which operates as in the first apartment, and shuts the door behind him, and at the same time opens the front door all ready for another rat. The baited rat having been shut into the second room, finds only one chance to get out, which he immediately proposes to do by raising a little door that lays in an angular position, and which fastens him into room No. 3. The trap is continually set, and from actual experience it has proven its entire practicability and usefulness, one night having caught eleven and other nights catching four, five, and six at a time. The inventor has applied for a patent, and they will soon be offered for sale.—*Sacramento Star.*

Hydraulic Quartz-crusher.—In this machine the common Chillian travelling crushing wheels are employed, and the patentees have hit upon the novel idea of placing water buckets upon the sides of the wheels, thus converting them into water wheels. The buckets are supplied from a small tank above, which rotates with the wheels, the tank being filled by a suitable conducting trough. When the water is let on, the wheels travel around in the usual circular quartz trough, without assistance from any other motor. The water is prevented from entering the quartz trough by an ingenious arrangement of aprons. John H. Perkiss and David Gay, Long Bar, Yubounty, Cal., are the patentees.

Trenton N. J. Gas Works.—This company have advanced the price of their gas to $3,50 per thousand. They make semi-annual dividends of 3 per cent.

SCIENTIFIC INTELLIGENCE,

Prepared for this Journal by Prof. HENRY WURTZ.

NEW METHOD OF TREATMENT OF SILVER ORES.

Ponmarède, referring to the known fact that the loss of silver in working the Mexican ores, amounts frequently to from thirty to thirty-ifive per cent. of the proportion indicated by assays, says that some of this loss is due to volatilization, but the greater part of it to imperfect chloridization of the ores. After being roasted seven or eight hours with common salt, the ores seldom contain as much as eighty per cent. of their original content of silver in the form of chlorid. The richer the ore, the more incomplete the chloridization. Poumarède believes this to be due to the irregularity of the action, a portion of the chlorid formed being again converted into sulphid or into metallic silver, the latter when thus formed being in such a condition that it will not amalgamate. He regards the commonly received view that the conversion of the siver into chlorides is dependent upon the oxydation of the sulphur by the air as fallacious, believing that the great quantity of silica present in the form of feldspar or quartz has an important influence, and that the presence of sulphur, of sulphuric acid, or of sulphates, is in no way necessary to the reaction. He states that if finely pulverized pure quartz be mixed with about one per cent. of silver powder and two to three per cent. of salt and heated half an hour to redness in a covered crucible, all the silver will be found to have passed into the form of chlorid, soluble in ammonia. If the silver is in the form of sulphid or any other mineral compound of silver, the same result is obtained. When, instead of quartz, feldspar either with or without earthly carbonates oxyd of iron or other constituents of the veinstone is used, the same conversion into chlorid takes place in an equally complete manner. The action of the alkaline base of the salt upon the silica of the veinstone has, therefore, the greatest influence. The application of these observations is obvious.—*Comptes Rending, tome 57, page 95.*

PRESERVATION OF WOOD BY MINERAL SUBSTANCES.

Pallas, as early as 1719, recommended the saturation of wood with green vitriol (sulphate of iron.) An old wooden wheel was lately found in an abandoned copper mine in St. Domingo, in an excellent state of preservation, though having been there beyond all record. Payen has made a chemical examination of it, and communicated at the meeting of the Academy of Sciences, of June 6, 1864, his results showing the presence of iron and some copper.

[The discrepant character of the effects which have been observed with different metallic solutions, when used in this way, are no doubt explained by the consideration that the presence of water is necessary to their effect. This is why the "Burnettizing" process with the highly deliquescent chorid of zinc has been found so generally satisfactory. Sesquichlorid of iron, or a mixture of ferric sulphate with common salt, would appear, on this account, to be infinitely preferable to ferrous sulphate. If ferrous or manganous chorid be used it should be mixed with a sufficient quantity of the deliquescent chlorid of calcium to keep the wood constantly water-soaked under the dryest conditions of atmosphere, &c. Chlorid of aluminum also seems to be a suitable agent, though alum and sulphate of alumina are not, and this chlorid, on account of its comparative cheapness, deserves trial above all other agents for these purposes. H. W.]

PECULIARITY OF BRITISH ANTHRACITE COALS.

Most people in this country know that coal similar to our invaluable Pennsylvania anthracites occurs largely in the British Isles, but the reason is not so generally known why its use for domestic, steam, and iron smelting purposes is universally rejected there in favor of the smoky, sooty, and crumbly bituminous coals. Independently of prejudice, however, there is a substantial reason why the Welsh anthracites are at present of little value. This is, that most of them have the property of decrepitating when heated, and flying, with a series of small explosions, into a powder more or less fine. We occasionally observe the same phenomenon with isolated fragments of our anthracites, though happily on a very small scale. Could we find a practicable method of utilizing the almost mountainous masses of anthracite dust or culm, which is constantly accumulating, in a increasing ratio, in our mining districts, such method would no doubt be equally, or even more valuable and applicable to these decrepitating Welsh anthracites.

DISAPPEARANCE OF THE NICKEL CENTS.

The public impression is that this is to be attributed to hoarding for purposes of speculation. The true reason, however, is that the manufacturers of German silver find the nickel coinage an exceedingly convenient material for their use, needing only the addition of a little zinc to convert it into an excellent alloy for forks and spoons, which require then but the application of a film of pure silver by voltaic precipitation, and are "warranted to wear for one year."

PRODUCTION OF A CRYSTALLINE STRUCTURE IN WROUGHT IRON.

In a recent essay, F. A. Paget makes some remarks on this important and interesting subject, of which the following is a very brief abstract:

"There is no necessity to have recourse to any theory of the crystallization of iron under impulsive stresses to explain the gradual deterioration of chain cables. A good cable bar consists of crystals that have been more or less elongated while passing through the rolls. But numberless experiments by Dr. Rankine and others and more particularly by Mr. Kirkaldy have shown that what is particularly called a crystal line fracture may be given to the most fibrous piece of iron if it be broken under a suddenly applied load—an effect simply due to the mechanical action of a sudden stress, and to the fact that any piece of iron is an assemblage of crystals." On the other hand, it seems to be ascertained that the long continued action of a red heat will produce a crystalline structure. "General Morin thus mentions the production of crystals, with facets from four to five millimetres in breadth, in a charcoal iron bar originally of fine, soft, fibrous texture." From which it is argued that great as would be the advantage of applying the process of annealing to large forgings, it is not advisable. Referring to the re-annealing of old chain cables, he says: "Mr. J. M. Gladstone, C. E., recommended this plan before the committee of 1860. Mr. Smale, then of Woolwich, said that this would be like Burnettizing rotten wood. Dr. Noad, in a letter to the *Times*, about eight years ago, stated that he had taken away the brittleness of an old chain by keeping it for twenty-four hours in a furnace. The late Mr. Glynn recommended that a crane chain should be annealed every three years. At the North Boskear mine, in Cornwall, the pit chains are brought to a red heat after every six months. The chain cables for the Russian Government, immediately after testing, are brought to a red heat, and then tarred—a plan which is said to prevent rusting."

NEW THERMO-VOLTAIC BATTERY.

James Dickson proposes a new class of voltaic batteries in which the liquid used is concentrated oil of vitriol kept constantly heated to a temperature of 600° Fahr., and in which iron is substituted for zinc, the negative plates being of course composed of platinum. Sulphur is liberated on the surfaces of the negative plates, which sulpher he believes will have a commercial value. He asserts that for 10¼ pence sterling, he produces in this way the same amount of electricity as for 17 pence by Grove's battery.

THE WATER OF THE DEAD SEA.

Some new observations on the Dead Sea water appear to present some points of interest. Roux, in an analysis of water collected in April, 1862, found it to be slightly alkaline in reaction, and to contain a little sal ammoniac. The presence of ammonia was also previously observed by Boussingault. Roux found 20.6 per cent. of non-volatile saline residue, which contained 0.364 per cent. of bromid of magnesium. Calculation shows that this salt, therefore, contains seven pounds per ton of bromine, this water being richer in bromine than any other known mineral water. The Dead Sea salt may hereafter become an article of commerce, as a material for the extraction of bromine. Every one remembers the discovery of silver in sea water by Malaguti and others. Aupin, a pupil of Malaguti, has bethought him of examining this Dead Sea salt for silver, and found in two kilogrammes of the salt one milligramme of the metal, equivalent to seven grains of silver in the ton.

IGNITION OF BLASTS BY MAGNETO-ELECTRICITY

In a "Preliminary Report" of the Patent Office for for 1863, a curious and novel device is mentioned applicable in rendering certain and reliable the now common use of Saxton's machine for igniting cartridges. Bearing in mind the well known conducting power of surfaces of graphite, formed by rubbing over a non-conductor with a common black-lead pencil, the inventor has bethought him of substituting for the fine platinum wire ordinarily employed for concentrating the intensity of the heat of the currents *a single trace* of such a pencil made upon a non-conducting, highly combustible surface, such as that of soft wood. It is found that in this way the wood may be set on fire and the cartridge is infallibly exploded.

[In England another device coming into common use of late, is to enclose the platinum wire in a small interior cartridge or fuse, charged with some explosive composition (the ingradients of which are kept secret, though such compositions are readily devised), which ignites at a far lower temperature than the powder itself. The two devices could no doubt be combined with an attainment of additional certainty.—H. W.]

To illustrate the benefit conferred upon the world by our countryman Saxton in inventing his magneto-electric machine, a benefit so seldom acknowledged and so little appreciated, we may quote some facts given in this Patent Office pamphlet. Experiments made at the Capitol, many years since, proved that to ignite powder at Baltimore, forty miles distant, by the voltaic current, required 150 pairs of Grove's battery; while by means of a Saxton's machine occupying less than a cubic foot, requiring no battery or chemicals, and always ready to furnish its power by the application of a little mechanical force (the pencil stroke device being used) powder has been fired through a distance of one hundred miles.

[In this connection it may be interesting to remember, that gunpowder was fired by electricity for the first time on this side of the Atlantic, European electricians having failed, through the well known effect of the electric repulsion of grains of powder when loose, which causes them to be scattered about before becoming hot enough to inflame. Franklin, in a letter to Peter Collinson, F. R. S., London, dated July 29, 1751, says: "I have not heard that any of your European electricians have ever been able to fire gunpowder by the electric flame. We do it here in this manner: A small cartridge is filled with dry powder, hard rammed, so as to bruise some of the grains; two pointed wires are then thrust in," &c. As is well known, the same object is accomplished more simply by slightly wetting the gunpowder, so as to cause it to cake together. It has been lately suggested to imbed the wire in the cartridge in such damp caked powder, the fluid used for wetting being one incapable of evaporation. Fluids suitable for this purpose would be dilute glycerine and solutions of the deliquescent nitrates of lime and magnesia.—H. W.]

MT. VERNON AND NEW ROCHELLE GAS LIGHT COMPANIES.—On the first of July, of the present year, these two young corporations passed from the hands of the trusteeship into those of a directory. Their operation may be dated as commencing from this transfer. They are separate organizations, but both are under the control of one superintendent.

Officers of the Mt. Vernon Company—President, Mr. John Egerton. Superintendent and Secretary, Dr. Ed. F. Drayton.

Officers of the New Rochelle Company—President, Mr. George Wilson. Superintendent and Secretary, Dr. Ed. F. Drayton.

OPERATING WATER-WHEEL GATE.—This invention consists in the employment or use of a supplemental hopper placed within the ordinary hopper of a pair of mill stones and connected by means of levers and a rock-shaft to the gate of a water-wheel, or to the idle or friction pulley of a driving belt, in such a manner that when the hopper becomes empty the gate of the water-wheel will automatically close, or the driving belt be slackened so as to stop the mill. Joseph Hough, of Westchester, Pa., is the inventor of this improvement.

THE AMERICAN GAS-LIGHT JOURNAL AND MINING REPORTER is published on the 1st and 15th of every month, and is a recognised official organ of—

LIGHT, HEAT, MINING INTERESTS.

PETROLEUM, WATER-SUPPLY, AND SCIENTIFIC SUBJECTS GENERALLY.

JAMES W. BRYANT, EDITOR AND PROPRIETOR.

W. S. SHERMAN, PUBLISHER.

PROF. C. ELTON BUCK, CONSULTING CHEMIST.

SUBSCRIPTION—Three dollars per annum in advance.

ADVERTISEMENTS.—One dollar per inch in column for each insertion. A discount of 10 per cent. allowed when inserted for three months; 25 per cent. when inserted for six months; and 50 per cent. if for one year.—Payable in advance.

☞ All communications to be addressed to "The Editor," No. 15 Nassau Street, New York.

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THE
AMERICAN GAS-LIGHT JOURNAL,
AND
MINING REPORTER,
PUBLISHED ON 2D AND 16TH OF EVERY MONTH.

JAMES W. BRYANT, ... EDITOR.

TUESDAY, AUG. 2d, 1864.

BACK NUMBERS WANTED.—We want to complete our files of the Journal, the following numbers, for which we are willing to pay full price.

Vol. II—No.'s 13, 22, 24, 25, 29 and 34.
Vol. III—No.'s 40, 42, 44, 47, 48, 52 and 56.
Vol. IV—No.'s 63, 64, 67, 68, 69, 70, 72, 74, 80, 82, 83.
Vol. V.—No.'s 91, 93, 95 and 96.

Those of our subscribers who do not bind the Journal, would do us an especial favor by forwarding to us any of the above numbers. We are being constantly called upon to furnish back issues of our paper by those who value it for future reference, and we have supplied them until all of the above numbers are exhausted.

OUR JOURNAL.—We are gratified to learn that the changes which we have made in the character of the Journal, meets the approbation of its former patrons, and that new patronage is liberally given us. For the notices of us which some of the Press have kindly made, we are thankful. Without presumption, we believe we may promise that this Journal will contain in its future issues such articles upon Gas Light, Gas Works and their appurtenances, the subject of Mining in its details, Petroleum interests, Water supply, and other Scientific matters, as will make it worthy a place in every library. It cannot be expected that each number will treat alike extensively all of these subjects, but from time to time we shall give them all due consideration, and the aggregate collection will prove satisfactory to our readers.

TO OUR PATRONS.—We would remind our patrons that scientific journals have but a limited support, and we would respectfully say, that we consider it a duty for parties, whose interests we represent, to extend us their patronage. Under our administration we are giving new subjects consideration, and a reference to our columns will show a compendium of original and selected matter of the most valuable character. We shall be thankful to our friends if they will interest themselves in enlarging our subscription list, and we promise to keep our Journal up to its present standard.

GLYCERIN FOR GAS METERS.—We advertise for Messrs. W. J. M. Gordon & Bro., Chemists &c., at Cincinnati, Ohio, Glycerin for Gas Meters, a sample of which can be seen at our office. This is the best fluid known for the purpose, and the respectable standing of the Messrs Gordon, insures a good article at a fair price. The Cincinnati Gas Co. have pronounced it to be the best article they have ever used. See advertisement in another column.

A NEGLECTED SOURCE OF WEALTH.

Written for this Journal, by Professor HENRY WURTZ.

GREENSAND MARL.

In these days of newly awakened enterprises in matters connected with minerals, it is appropriate to recal attention to a mineral product which occurs in exhaustless abundance at our very doors, and from which it is believed that great revenues should be drawn, the only prerequisite being the application of chemical skill and experiment. This mineral is the greensand marl of New Jersey, which contains potash in such a form that chemical agents easily extract it. The writer of this tried fourteen years since to urge upon the public the availability of this substance as a source of potash and its compounds. His article on the subject was read before the meeting of the American Association for the Advancement of Science, at New Haven, in 1850, and was published in *Silliman's Journal*, Vol. 10, page 326. His analyses there given, show from five to six and a half per cent. of potash in the unwashed marl, which is considerably less than found in the washed greensand by the previous analyses of Professor Rogers, the first New Jersey State Geologists. Rogers's results are now believed, however, to have been too high, and to be on the safe side, it may be assumed that the average of potash in washed greensand of a good quality will be at least seven per cent. This is equivalent to 157 lbs. of anhydrous potash; or 188 lbs. of pure hydrate of potash per ton of 2,240 lbs. Now the very best qualities of American potashes, worth at the present market rates $14 per cwt. (and rising rapidly) contain not more than seventy per cent. of pure hydrate; so that a simple calculation shows that one ton of washed greensand marl, which should be delivered in New York for probably $7 or $8, contains $37 60 worth of potash. In the article published in 1850, referred to above, results were given of numerous experiments tending to methods of making this potash available.

In the present improved state of chemical knowledge great improvements upon these methods could readily be made. Among these methods was one of making alum, by first heating the greensand red hot, then acting upon it with dilute sulphuric acid, crystallizing the solution, adding to the mother liquors a small quantity of chlorid of potassium, obtained by another method from the greensand itself, which converts the iron alum formed into common alum and crystallizing again. If only five of the seven per cent. of potash present were thus obtained in the form of alum, the quantity of alum from a ton would be 1,120 lbs.; only ten per cent. of crystallized alum being potash.

I may here cite some results obtained by Mr. George J. Scattergood (published in the *American Journal of Pharmacy* for May, 1864), in attempts to obtain alum from greensand, by methods inferior, however, as I think, to those invented by me fourteen years before. Mr. Scattergood, operating on 7,000 grains of unwashed marl, containing nine per cent. of clay, and six per cent. of potash, with 1,750 grains of sixty-two per cent. sulphuric acid, obtained in one experiment upon the raw marl 1,236 grains of alum, and in another experiment, in which the marl was previously ignited, 1,686 grains of alum. This last result, though far inferior to those which I obtained (operating, of course, upon other varieties of the mineral,) and corresponding to but about one-third of the potash contained in the greensand, is regarded by Mr. Scattergood as rendering probable the profitable manufacture of alum in this way. This gentleman seems wholly unaware of my previous experiments, or at least makes no allusion to them; I gave also, in the article before mentioned, another practicable method of obtaining a commercially valuable product, chlorid of potassium, from the greensand, by fusing the latter with chlorid of calcium, a very cheap substance produced as a waste product of several manufactories. This method I regard as exceedingly valuable.

I believe that the present time is highly favorable to the successful initiation of a new and great industrial application, founded upon the treatment of this potash mineral, greensand, by chemical agents in a number of ways suggested both in my previous papers, and by recent developments of chemical science; and I therefore earnestly call the attention of capitalists to this subject. Should any especial interest be awakened by these brief introductory remarks, they will be followed by more extended articles on this subject.

EXORBITANT GAS BILLS.

There is probably no complaint made which is more unreasonable and unjust than the frequent one, that "our gas bill is exorbitant." It may occur occasionally that the meter furnished by the gas company or its agent measures the gas incorrectly, but when it does, the advantage is generally favorable to the consumer, for reasons unnecessary to explain here. When a greater quantity of gas is charged for than appears to be reasonable or just, it will generally be found that either the joints, or fittings, or pipes outside of the meter, leak, or that there is an extravagant use of gas either in the public rooms or places unobserved by the proprietor, or what is almost invariably the case, a large quantity of gas is allowed to pass through the burners unconsumed, when the pressure upon the pipes is greater than is proper to permit perfect combustion at the tip of the burner. If these things were attended to, gas bills would be satisfactory.

But let us consider the cost at which we are now obtaining light from gas companies and compare it with other artificial light. The standard burner for estimates, is one which consumes five cubic feet per hour of common illuminating gas, which gives a light equal to from fifteen to seventeen sperm candles, each burning 120 grains per hour. The cost of five cubic feet of gas, at the price in this city ($2 50 per thousand cubic feet,) is one and one-quarter cents, while the cost of 1,800 grains—about five ounces—of sperm candles, at fifty cents per pound, would be fifteen cents. How few persons realize, when sitting in a room with four five feet burners of gas in full blaze, that they are indulging in the luxury of a light, which sixty to eighty sperm candles would be required to give.

If consumers will see that their fixtures and fittings do not leak, and be as economical in the use of gas as they would be of candles or lamps, they will not have cause to complain that their gas bills are exorbitant.

At the present price of coal, the cost of gas to the company's manufacturing it is not less than the price they are charging consumers.

GAS BURNERS.—There is nothing in reference to gas light more important to gas consumers, than the kind of burners used. The influence upon the surrounding atmosphere—the effect upon the eyes, especially in reading or writing—the waste of gas, when the main pressure is strong, causing increased gas bills with a diminished quantity of light, all depend upon the proper combustion of the gas which passes through the burner. Patent burners, checked or stuffed with all sorts of things, such as screws, wire gauze, metal tubes, wool, saw dust, iron filings, &c., &c., have been placed before the public so often, that the very name of "Patent gas burner" has become a nuisance, because so many of them have proved of less value than a good plain burner free from all incumbrances. Notwithstanding all this, there is a necessity of obtaining a bright light and a proper combustion of the gas, and whenever the pressure in the gas pipes exceeds 5-10 of an inch, there should be some restraint upon the passage of gas through the burner. It is necessary that gas from the pipes should be *detained* at the tip of the burner long enough to imbibe sufficient oxygen from the

atmosphere to produce perfect combustion, and of course when by extra pressure in the pipe the gas is forced too rapidly through the burner, much of it escapes unconsumed. At some points the pressure is 2½ inches—five times what is actually required to give a steady rich flame. When this is the case, if the gas valve is turned full on, the blast through the tip of a five foot burner (without any check) would pass more than thirty cubic feet of gas per hour, and the light be less brilliant than with a proper consumption of five feet only.

In a future number, we propose to discuss the merits of different burners, with their respective checks and controllers, and wish all parties interested would forward us a statement of the nature of their improvement, and if convenient send us specimens.

The calm which now pervades the mining interests, can be judiciously improved by dispassionately and deliberately examining the many propositions presented to the public. Accounts from the Mining districts are generally satisfactory under the circumstances incident to them, and there is great encouragement for continued investments. The disasters in Colorado from the freshets will soon be forgotten in the great returns which that rich district renders for enterprise and labor, and there is every exertion being made to restore the country to its former prosperous conditions.

Almost every one of the old California mines sustain themselves fairly, and many of them are yieldig better results than ever.

New Hampshire is opening some favorable mines, and the Jackson tin mine is promising a rich vein of copper, in addition to its other valuable interests. We are promised a full description of this Mine, which is attracting much scientific attention.

STANDAND GOLD COMPANY OF COLORADO.—Attention is called to the advertisement in another column of this company.

Parties wishing to invest in an enterprise of this description—where all subscribers are placed upon the same footing—will do well to investigate the condition of the Standard.

The capital stock consists of 50,000 shares of $10 each—10,000 shares are retained in the treasury of the company as working capital; these s a es are disposed of by the directors as the exigencies of the company require, thus obviating the necessity of levying assessments. Of the remaining 40,000 shares, 26,500 have already been subscribed for, leaving but 13,500 shares at the original subscription price.

We notice one feature which we consider of importance to parties taking stock as an investment, and that is, the fact that all subscribers are required to sign an agreement not to dispose of their stock for less than $6 per share, for the space of six months, provided that nine-tenths of the stock is so locked up at the expiration of that time, the expectation being that the company's property will be so far developed as to cause a demand for the shares at $6, or over, in the market, this arrangement preventing parties from throwing their stock npon the market as soon as a profit is realized upon the subscription price, to the injury of the other persons in interest.

As there is but a limited number of shares to be had at the subscription price of $3 per share—and that being rapidly taken—parties interested will do well to investigate before the opportunity to subscribe at the low figure is lost.

The office of the company is at No. 12 Wall street, where the subscription and other books may be found.

The President of the Company, Mr. Robert Bowne, is the well known publisher of Pearl street, a man not likely to take the presidency of a company until well satisfied of its merits. The Secretary, Mr. F. A. Mitchel, is a son of the late General O. M. Mitchel, of Massachusetts.

IMPORTANT DISCOVERY.—Dr. Richardson, an English chemist, claims to have made the discovery that iodine placed in a small box with a perforated lid, is a good means of destroying organic poison in rooms. During the late epidemic small-pox in London, he saw the method used with benefit.

The Buffalo Gas Light Co., have fixed their price for gas at $3 50, nett, instead of $3, as heretofore.

PETROLEUM REVIEW—AUGUST 1ST.

NEW YORK, AUG. 1, 1864.

Crude.—The market has been firm since my last, fluctuating but little—and that with the price of gold. The sales have all been made at about 50 to 51 cents, according to quality.

Refined.—In bond, has been active, with a spirited export demand. At the close, I notice sales of 3,000 bbls. at 82 cents for prime light straw to white; 2,000 bbls. at 84 cts. prime white, and 3,250 bbls. light straw to white, at 81 cents. There are more buyers than sellers at these prices.

Free.—The sales have been limited, although the prices have ruled much in favor of the buyer. 500 bbls. prime white sold at the close for 87 cents; 250 bbls. light straw to white, at 86 cents. The bulk of free oil offering is of straw color, and brings according to quality 80 to 85 cents.

Benzole is dull, and may be quoted at 50 cents.

Remarks.—In consequence of gold being unusually steady, oil has fluctuated but little for the past fifteen days. The weakness of free oil, compared with bonded, is without parallel in our market. Even with a tax of 20 cents on refined oil, free and bonded have sold for about the same price, and thousands of gallons of free oil has been shipped as if in bond.

Advices from Oil Creek, say the production is increasing, several new wells having been struck in the last few days, and as a consequence prices of crude oil is falling. The arrivals for the past fifteen days are 36,414 bbls.; exports same time, 2,075,823 gallons; and since January 1st, 10,030,448 gallons.

B. L. HARSELL,
Commission Merchant,
132 & 134 Maiden Lane, N. Y.

GAS COAL LAND WANTED.—A gentleman wants to rent a tract of Gas Coal land, of about one hundred acres, situated in Westmoreland county, convenient to water navigation, to work for a term of years. Further information will be given at this office.

NEW YORK TO THE WHITE MOUNTAINS.—*To Tourists.* We invite attention to the Connecticut River Valley Railroad, which offers great inducements to those seeking famous places of summer resort. The cars on this route are comfortably and richly furnished, and the road being sixty miles shorter than any other route, offers a means to travellers that is not to be obtained from other lines of railroad. The courteous, gentlemanly, and well known C. W. Poulson, is the General Travelling Agent.

FORMATION OF IRON BY METALLURGICAL INSECTS.—A Swedish naturalist, M. Sjogreen, has recently published a curious memoir on an iron mineral which is, he contends, the direct work of infusorial animalculæ, living in the midst of sweet water. This ferruginous mineral, known under the name of lake-ore, is sufficiently abundant in certain Swedish water-courses to be submitted to treatment in ironworks. The memoir of M. Sjogreen was composed with more especial reference to certain specimens of minerals shown in the International Exhibition, in London, in 1862. A lake in his neighborhood had fallen much below the ordinary level, and enabled him to follow the evolution of the mineral. The bottom of the lake was in part laid bare, from the extreme lowness of the water, but there still existed depressions, filled by water and occupied by insects or infusorial metallurgists. These depressions presented a strange and marvellous spectacle. At the bottom of one, which was somewhere about three feet in diameter, small creatures of different sizes agitated themselves on the mineral, some being visible to the naked eye, while the others were so small that without a magnifying-glass it would have been impossible to discern them. All were actively engaged in inclosing themselves in a metallic envelope, just as the caterpillar encases itself in a cocoon; and the work seemed to the spectator to be effected in a systematic manner. The iron exists in the waters in a soluble state—or, rather, the waters borrow it from the surrounding lands. Lake mineral is produced with considerable rapidity: in certain lakes from which there had been extracted twenty-six years previously all the metallurgical crop, there was again found after this yield a fresh harvest of almost equal abundance.

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NEW YORK *August 1st*, 1864.

	Bid.	Asked		Bid.	Asked
Copper Stocks.			***Gold Stocks.***		
Aztec	6	8	Benton	1⅝	1⅝
Bedford	1	1⅛	Connecticut M'g Co	—	1⅜
Boston	4¼	6	Consol'd Gregory	25	30
Caledonia, A. P.	10	12	Corrisanie	—	—
Canada	4	4½	Corydon	—	3½
Carp Lake	4	5⅜	Gunnel	3⅞	4
Central	62	65	Isaac's Harbor	⅞	1⅛
Columbian	—	25	Kipp & Buell	—	3
Copper Falls	—	—	Mammoth Gold	—	—
Clifton	60	81	Mariposa	47½	48
Dacotah	—	5½	New York	—	3⅜
Derby	⅜	1⅜	N. Y. & Nova Scotia	⅝	2
Douglass	—	—	Quartz Hill	—	13
Evergreen	19	20	Quicksilver M'g Co	80	88
Flint Steel River	12	13½	Rocky Mountain	—	9⅜
Frue	4	5	Smith & Parmelee	6	—
Grand Portage	—	84			
Hancock	12¾	14	***Coal Stocks.***		
Hamilton	4	6½	American	94	100
Hilton	5	6	Ashburton	—	—
Hudson	1	2	Central	62	65
Huron	37	39	Cumberland	59	61
Indiana	8¾	9½	Del. & Hud. Canal	209	212
Isle Royale	19½	21	Hampshire & Balt.	—	—
Keweenaw	—	6	Pennsylvania	218	221
Knowlton	7	8¾			
Lafayette	1¼	2⅜	***Lead Stocks.***		
Manhattan	8¾	10	Bucks County	—	¾
Mendota	3	4½	Clute	—	1⅞
Merrimac	4	5	Erie	—	2
Minnesota	41	45	Macomb	—	—
New York, A. P.	—	—	Placentia Bay	1¾	2
N. J. Consolidated	3½	4½	Sussex	—	80c.
Norwich	—	6⅝	Wallkill	2¾	3⅜
Ogima	5	7			
Ontonagon	4¾	5¼	***Iron Stocks.***		
Penn	9¾	11½	Copake	7⅜	9⅜
Providence	1¾	2	French Creek	1½	2
Quincy	101	102¾	Teal Lake	5⅜	7
Reliance	1¾	2¾			
Rockland	13	15	***Miscellaneous.***		
Superior	10	10½	Rutland Marble	—	—
Sharon Consolidated	—	2¾			

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COPPER STOCKS.—Aztec 6¼, Bedford 1⅛, Boston 38, Canada 4½, Carp Lake 4, Huron 37, Isle Royale 20, Knowlton 7½, Manhattan 9¾, Mendota 4½, Merrimac 4, Minnesota 41½, N. J. Consolidated 3½, Ontonagon 5, Penn 10½, Providence 1⅞, Quincy 102, Rockland 13½.

GOLD STOCKS.—Gunnel 3¾, Isaac's Harbor 1, Mariposa 47½, Montana 1, New York and Nova Scotia ⅞, Quicksilver 80½, Smith & Parmelee 4.

COAL STOCKS.—American 95, Cumberland 59¾, Central 62½, Hampshire & Baltimore 109, Delaware & Hudson Canal 210, Pennsylvania 220.

LEAD STOCKS.—Bucks Co. ¾, Macomb 4, Placentia 1½, Sussex ⅞, Wallkill 3.

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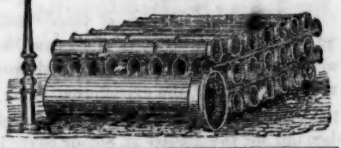

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KENT'S EAST INDIA COFFEE,

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as there are numerous counterfeits afloat under the name of "Genuine East India Coffee," "Original East India Coffee," etc., put forth by imposters to deceive the unwary.

In 1 lb. packages, and in boxes of 36, 60, and 100 lbs., for Grocers and large Consumers. Sold by Grocers *generally.*

Orders from Country Grocers solicited, to whom a very liberal discount will be made.

Wholesale Agents: Hoeflish & Molan, and W. J. Heiss & Bro., Philadelphia; Francis H. Perry, Providence; A. L. Waite & Co., Boston; Pynchon & Lee, Springfield, Mass.; S. N. Callender, Buffalo; Gordon McMillan & Co., Cleveland; A. A. Colter & Co., Cincinnati; J. & J. W. Bunn, Springfield, Ill.: H. B Shields, Corydon. Ind.; and C. C. Garber, Chicago.

The Am. Adv. Agency, 308 Broadway, N. Y., will receive orders for the above named Coffee.

Business Dep., E. ALVORD. | *Corresp. Dep.,* FOWLER & WELLS.

"MAY THE BEST MAN WIN."

SAVE YOUR MONEY!

The Cheapest, most Delicious and Healthy Coffee in the World!!

LEIBIG'S

ESSENTIAL

COFFEE

The most Healthy,
The most Economical,
The most delicious

PREPARATION OF COFFEE

IN THE WORLD,

OLD OR NEW.

This Coffee is prepared under a formula from the great German chemist,

PROFESSOR LEIBIG,

and gives the essential full strength and delicious flavor of OLD GOVERNMENT JAVA COFFEE, which is the only quality of Coffee used in its preparation, without any of that narcotic quality which so sadly damages the nervous system in the use of even the best grades of Coffee as ordinarily prepared.

2d. It gives the essential tonic and diuretic elements of Dandelion, without the "hereby," coarse taste so disgusting, and yet always found in the ordinary Dandelion Coffee.

It is known to all acquainted with chemistry, that the essence, or oil, or whatever name may be given it, when properly and scientifically obtained from any herb or plant, is a far different article from that produced by putting that plant into water and boiling it out—permitting the escape of the most exquisite and reliable strength and leaving the coarse and earthy drugs precipitated or in solution.

So this preparation combines the exquisite aroma of the Java Coffee, with the highest essential excellence of the most choice Dandelion—yielding the spirit without the grosser earthy body of both; thereby avoiding the deleterious effects of both and becoming at the same time

The most Delicious Beverage

AND THE

Most Health-giving and Restoring Drink

Known in the world—being at once a sovereign remedy instead of producer of

Dyspepsia and General Nervous Debility,
Flatulence, Fulness of the Head,
Dizziness, Costiveness, and
diseases of the Liver
and Kidneys,

because of its great Tonic and Diuretic qualities.

The simple fact that the preparation is from Baron Leibig, will commend it to the attention of the scientific in all parts of the country, while the use of it will at once and permanently prove to the masses everywhere that it is the long-needed desideratum—in its way.

The immense popularity of this Coffee in the Old World is an earnest that its use and popularity in America is bound to become continent wide.

Another consideration not to be overlooked in regard to the matter, is that

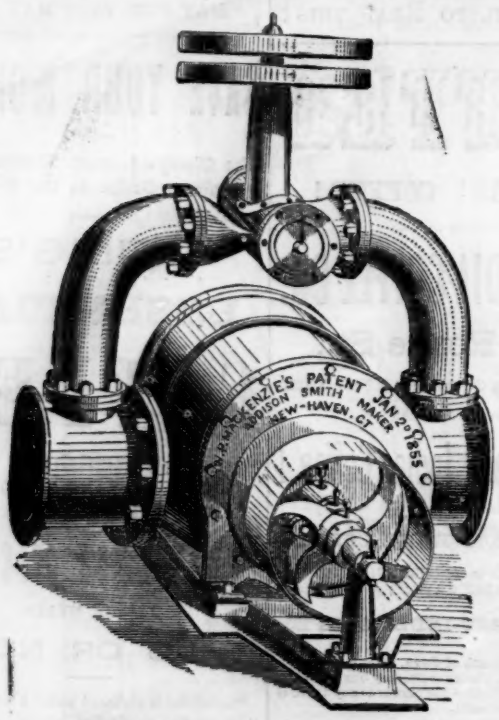
It Costs Less than Ordinary Green Coffee.

And requires less than half the quantity to give the same degree of strength, and its use proves it at 30 cents a pound to be cheaper than Maricaibo coffee at 15 cents a pound.

Neatly packed in pound papers, with full instructions for use on each label—in SIXTY POUND BOXES. Price, 30 cents per pound. A liberal discount to the trade.

Manufactured by the PEOPLE'S PROVISION CO., 268 Greenwich street, N. Y., to whom all orders may be addressed.

Sold by wholesale Grocers and Druggists.



SMITH & SAYRE,

Sole Proprietors and Manufacturers of

THE MACKENZIE PATENT GAS EXHAUSTER

AND

PATENT COMPENSATOR.

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. uel Address SMITH & SAYRE, 458 Broadway, New York.

HARRIS & BROTHER,

PRACTICAL GAS METER MANUFACTURERS,

Continue, as heretofore, at their old Establishment,

No. 1117 CHERRY ST., PHILADELPHIA,

TO MANUFACTURE

WET AND DRY GAS METERS (Consumers'),
STATION, EXPERIMENTAL AND SHOW METERS,
GLAZED METERS, METER PROVERS, AND PHOTOMETERS,
GOVERNOR AND CENTRE SEAL DRUMS,
FLUID AND PRESSURE GUAGES,
PRESSURE REGISTERS AND INDICATORS, &c., &c., &c.

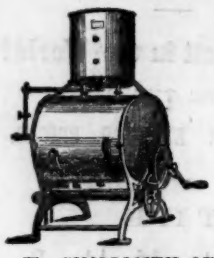
All our work warranted. All orders addressed to

HARRIS & BRO., 1117 Cherry Street, Philadelphia.

DRAKE'S

PATENT

AUTOMATIC GAS MACHINE.



THIS MACHINE, which has been in constant use for more than two years, is now acknowledged to be the

Most Convenient, Simple, and Efficient Method

OF LIGHTING BUILDINGS OF ALL KINDS, out of the reach of regular gas-works, ever brought to public notice.

The SIMPLICITY OF THE APPARATUS, its ENTIRE FREEDOM FROM DANGER, the LITTLE ATTENTION REQUIRED, the EASE WITH WHICH IT IS MANAGED, and THE CHEAPNESS and SUPERIORITY OF THE LIGHT, has gained for it the favorable opinion of those acquainted with its merits.

The Machine takes up but little room; no disagreeable odor is experienced in its use; no fire is applied to the apparatus at all; it can be attached to ordinary gas-pipes used for coal-gas, and is burned through the same kind of fixtures.

These Machines are manufactured in Boston, by the AUTOMATIC GAS-MACHINE CO., and are for sale at their Store, 78 Washington street, Boston, and also at the Agency, MITCHELL, VANCE & CO.'s, No. 620 Broadway, New York.

For further particulars, address—

MITCHELL, VANCE & CO.,

620 BROADWAY, NEW YORK CITY.

PRINCE'S METALLIC PAINT,

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

DANIEL SLOAN, General Agent,
115 LIBERTY STREET, NEW YORK.

Local Agents—S. R. WILLIAMS, 204 South Front st., Philadelphia.
CALVIN GAY, 29 Doane st., Boston.

THE

STANDARD Gold Company

OF COLORADO.

DIRECTORS,
ROBERT BOWNE,
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MINES on FISK LODE,
BOBTAIL LODE,
GROUND HOG LODE,
ENTERPRISE LODE,
and others,

In all, 8,625 feet (linear), and large water powers and mill sites.

Capital issued, 40,000 shares, at $10 per share.

A limited number of shares are offered at the low SUBSCRIPTION PRICE (having been reserved for their customers), by

WILLIAMS & MITCHEL, 12 Wall Street.

SAFEST AND CHEAPEST SYSTEM OF INSURANCE.

WASHINGTON

INSURANCE COMPANY,

172 BROADWAY,

Cor. Maiden Lane, NEW YORK.

CASH CAPITAL, - - -	$400,000.
Assets, June 1, 1864, - - -	600,000.
Scrip Dividend, 1863, - -	60 per Cent.
Scrip Dividend, 1862, - -	60 per Cent.
Scrip Dividend, 1861, - -	60 per Cent.

The Policies entitled to participate receive 75 per cent. of net Profits.

Insures Buildings, Merchandise, Furniture, Rents, Leases, against loss or damage by FIRE, and MARINE RISKS on LAKES, RIVERS and CANALS.

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SATTERLEE & CO.,

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G. B. SATTERLEE, H. TRACY ARNOLD,
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Mining Stocks bought and sold at the regular Mining Boston and Philadelphia Boards.

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NEAR WALL ST., NEW YORK.

Special attention given to the Buying and Selling of Gas-Light Companies' Stocks.

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ÆTNA FIRE INS.

COMPANY OF NEW YORK,

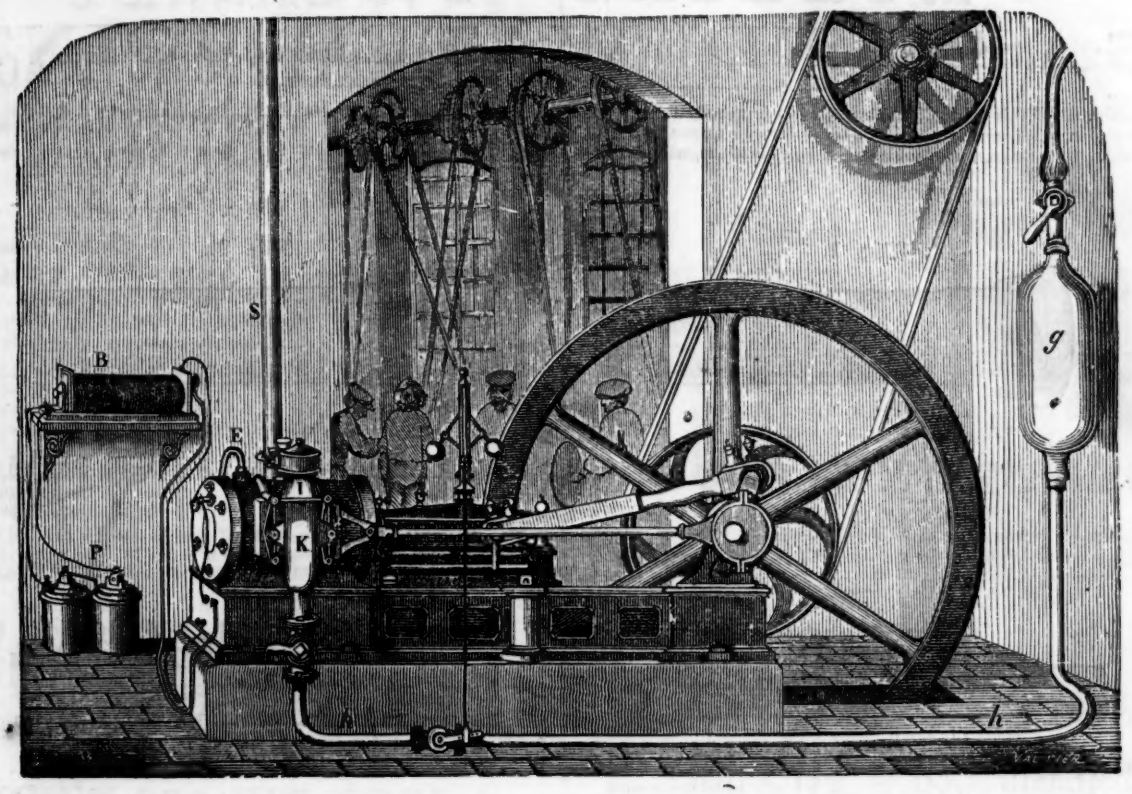
No. 170 Broadway.

CASH CAPITAL,	CHARTERED
$200,000.	**1824.**

The insured receive seventy-five per cent. of the net profits annually, without incurring any liability. When preferred, a discount will be made in lieu of participation in profits.

Scrip Dividend of 1861, - - 50 per cent.
Scrip Dividend of 1862, - - 50 per cent.
Scrip Dividend of 1863, - - 50 per cent.

JACOB BROUWER, *President.*
H. C. BEACH, *Secretary.*
WM. H. BARBOUR, *Asst. Sec.*



MOTEUR—LENOIR.

LENOIR GAS ENGINE.

This is a horizontal engine, in which a piston, by a connecting rod drives a horizontal shaft.

The gas enters by the pipe "h" from the regulating reservoir "g," (made of vulcanized india rubber,) which regulates the feeding and the branches connected with the gas-pipe.

The tube, K, receives the gas conveyed by the pipe "h," and conducts it to the valve, which opens and closes alternately, by means of a rod moved by an eccentric wheel fastened to the end of the shaft.

Two of Bunsen's piles, P, sufficient to produce the electricity are placed at a little distance from, and in communication with a Ruhmkorff electric apparatus, B. The electric current of this apparatus is conducted by means of insulated wires to the electricity distributor "m," placed on the front of the frame, while the current of electricity and its arrival at the inflammator, inserted at each end of the cylinder, is directed by the movement of the piston-rod, which, by an ingenious combination, impels a small movable slide before the distributor.

The burnt gas, after having performed its functions in the machine, escapes, by means of a valve, through a pipe, S, and the water designed to cool the interior of the cylinder enters through a double passage, by means of a pipe situated near the escape-valve, and goes out by the pipe, E.

A two horse and a half horse Engine are now in practical operation at the brass cock manufactory of Mr. A. Carr, *No.* 135 *Mercer St, between Prince and Houston Streets,* New York where those interested are invited to call and examine them.

THE LENOIR GAS ENGINE

Requires no Fire and makes no Smoke,

No Noise, no Dirt, and is thoroughly safe.

It is propelled by the expansion of Air, dilated by the combustion of Gas within the cylinder, ignited by the

ELECTRIC SPARK.

ROBBINS' PATENT GAS AND WATER JOINT.

THE PROPRIETORS of this unrivalled joint are now prepared to introduce it to general use, and to guarantee that, in all respects, it will fulfil perfectly all the requirements of either water, gas, or steam. It is a joint which remains in all situations absolutely tight.

The following illustrations, with the appended explanations, will give a good idea of the improvement:

Fig. 3.

Fig. 1.

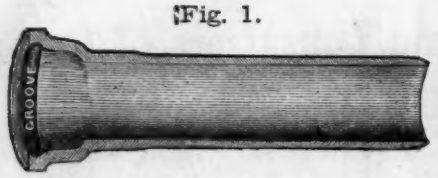


Fig. 2.

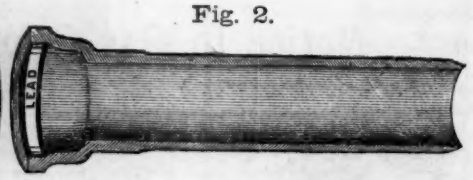


Fig. 4.

FIG. 1. Is a sectional view of a pipe showing a groove to receive a lead ring.

FIG. 2. Is a sectional view of a pipe showing a lead ring in the groove.

FIG. 3. Represents a former, which is used in the bell end of the pipe while casting the lead ring. Before using the former, however, a strip or belt of India rubber is first inserted in the socket, against which the former rests to prevent the lead escaping from the groove while being cast. Upon the cooling of the lead, the former and rubber ring are withdrawn from the socket, and the lead ring is left projecting inwards from the groove all around, forming an indestructible packing to receive the spigot-end of the pipe.

FIG. 4. Shows two pieces of pipe in connection with an hydraulic jack, by which the spigot-end of the pipe (which is cast tapering and may be cast in a chill), is forced into the lead ring in the groove which perfects the joint. A, represents the jack; B, B, the chains by which the pipes are drawn together; and C, C, pieces of pipe.

This ring joint packing may be cast at the foundry or any convenient place, and when delivered at the ditch, may be laid, and perfect joints formed, by any laborer, above or below the surface, or in ditches filled with water, there being *no joint ditching required*, and it can be laid with very great rapidity.

Among the economies realized by this joint may be enumerated, the saving in the weight of the pipe, in the amount of lead required to be used in forming the packing, in the labor of ditching, and in laying the pipe.

The bell or socket may be cast one-half the usual length, as the width of the groove requires, but from a half to one and a half inches, according to the size of the pipe, thus saving in the total weight about two hundred pounds per ton.

The weight of lead required to form this joint, as compared with the amount of lead used in forming a joint according to the old method, is fully seventy-five per cent. less, only so much being required as to maintain the compensating principle, or enough to allow (upon the raising or depressing of the line of pipe out of a direct line) what is lost upon one side of the ring packing, to take its place upon the other; thus securing flexibility of the joint without affecting its reliability. The use of yarn or hemp packing is dispensed with, the cost of which is an entire saving as compared with the old method of making joints.

The saving of labor in ditching is the total amount usually expended in digging joint-holes, there being *no joints to be caulked.*

The saving in labor in laying pipe furnished with this joint is a sum equal to the whole cost of carrying lead, fuel, ladles to the ditches, casting the lead, bailing out water, and the entire labor of caulking, less only the sum charged for casting the lead ring packing at the foundry, which is comparatively trifling. This last-mentioned economy has been estimated by the best engineers at seventy-five per cent., or the same as the saving in the quantity of lead used.

The cost of pipe cast from our patterns is the same per ton as pipe cast for the old form of joint. The principal iron-founders propose to charge the same price.

We have submitted these joints in water-pipes to a pressure of two hundred and fifty pounds to the square inch, and they have remained perfectly tight. It has also been submitted for months in gas-pipes to the ordinary pressure of our city gas-mains, without any leakage whatever. We are aware that these statements may be deemed by many extravagant, but the merits of the improvement warrant them all, and the most skeptical may be fully convinced by an investigation of its value, and by witnessing the tests to which we submit it, or by its use under any conceivable circumstances.

TESTIMONIALS.

OFFICE OF THE WATER COMMISSIONERS,
CITY HALL, JERSEY CITY, October 14th, 1863.

Dear Sir,—On the 26th of May last, about two hundred and sixty feet of cast-iron water-pipes, six inches in diameter, with joints constructed according to your invention, were laid for the Jersey City Water-Works, in Prospect street.

The operation of uniting the joints of the pipes, was performed with remarkable facility, and with an important saving in time, materials, and labor. The joints proved perfectly water-tight, after turning the full head of water on the pipes.

In my opinion, your invention has proved entirely successful, and will be found highly beneficial to water companies.

Yours, respectfully,
ROBT. C. BACOT,
Superintendent and Engineer, Jersey City Water-Works.

MR. R. C. ROBBINS.

ENGINEER'S OFFICE, CROTON AQUEDUCT DEPARTMENT.

Dear Sir,—I have examined your plan for making joints in cast-iron water pipes, and have a report from one of my assistants, of certain experiments made by you, to prove the certainty and economy with which the joints can be made, and their stability when finished.

I think the experiments showed that the joints could be made quite as rapidly, if not more rapidly, than those made in the ordinary method now in use; the quantity of lead used was less than that required in the common joint, and no yarn packing was required. In these respects, your joint seems superior.

After the joints were made, a pressure of three hundred pounds to the square inch, was put upon the pipe in such a manner as to test the efficiency of the joint to prevent both leakage of water, and separation of the pipes from each other longitudinally. This pressure failed to produce either leakage at the joint, or separation, so long as the pipes lay in a direct line; but on deflecting them six and a half inches, in a length of twelve feet, the joint commenced leaking. It is fair to add, that this is a greater deflection than would often be found necessary in laying pipe.

I think the efficiency of the joint in both the points tested in this last experiment, might be increased by increasing the quantity of lead, both in thickness and width.

Altogether, the result of the experiments was such that I have determined to make a more thorough test of your invention by putting down about one thousand feet of pipe, when we commence our operations for the coming season.

The diameter of the pipe subjected to experiment, was six inches, and is the same size that I propose to put down next year.

I am, very respectfully, your obedient servant,
A. W. CRAVEN, Chief Engineer, &c.

To R. C. ROBBINS, Esq., Jersey City.

METROPOLITAN GAS-WORKS,
ENGINEER'S OFFICE, NEW YORK, October 9th, 1863.

Dear Sir,—The undersigned had the pleasure of being present at an experimental test of your patent joint for gas and water pipe, made at the yard of the Croton Aqueduct Department, and cheerfully testify to the results obtained, namely:

First experiment was made with two lengths of eight-inch pipe, jointed together, when a pressure of three hundred pounds to the square inch was applied. This pressure did not force the pipe apart, nor start the joints, but they remained, during this experiment, perfectly tight.

Second experiment was made by deflecting the pipe five inches, which is about equal to eighteen inches in one hundred feet, and the same pressure applied, which caused a small leak at the joints.

Third experiment was made by taking the pipes apart and rejointing them, when the same pressure was applied when lying straight and when deflected; at this experiment there was no leakage.

From these severe tests it is my impression that the superiority of your patent joint has been made manifest, and that it must eventually supersede the old way of jointing pipes together, saving both time and material.

Wishing you success in your enterprise,

I am, very respectfully, yours, &c.,
AMBROSE J. WHITE, Engineer.

To R. C. ROBBINS, Esq.

OFFICE OF THE METROPOLITAN GAS-LIGHT COMPANY,
NEW YORK, October 9th, 1863.

Dear Sir,—Having been present at the testing of your patent joint for gas and water pipe, at the yard of the Croton Aqueduct Department, I can testify to the results as stated by Col. A. J. White and fully concur with him in the opinion expressed in his letter to you of this date.

Very respectfully, yours,
W. TITUS, Secretary.

R. C. ROBBINS, Esq.

NEW YORK, October 23d, 1863.

Gentlemen,—I am pleased to be able to inform you, that we are fully satisfied that we have done well in adopting your "Improved Joint," in the construction of an aqueduct which we are now building on Oil Creek, Northwestern Pennsylvania.

We have ten miles of three and four inch pipe to lay this season, and, in our estimation, the perfection of the joint, economy in lead, and rapidity with which the pipe can be laid, render it entirely preferable to any other method of laying pipe.

Our Mr. Hutchings advises us that he is putting down the three and four inch pipe at the rate of twenty-five to thirty lengths per hour, with two men in the trench. We are much pleased with this result.

Respectfully yours,
HUTCHINGS & FOSTER.

Messrs. R. C. ROBBINS & Co.

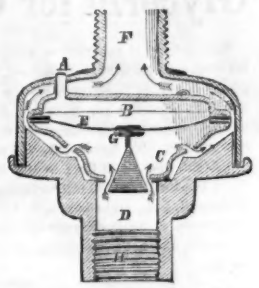
For further information, or for prices and terms, which will be very reasonable, apply to

R. C. ROBBINS & CO.,
No. 218 FULTON STREET, NEW YORK

THOMPSON'S

PATENT

AUTOMATIC GAS CONTROLLER.



Notice to Gas Companies and Consumers of Gas generally.

WE RESPECTFULLY INVITE YOUR ATTENTION TO THE FOLLOWING TRUTHFUL DESCRIPTION OF THE construction and operation of this recent and most important invention; its application to every street lamp, and on the fixtures within the works of the Gas Companies, as well as for the use of the general consumer, will be found to effect perfectly and reliably, the object so long sought for, viz.: **a perfect control of the Gas under varying pressures, emitting the Gas at the burner without force, and without increase or diminution of quantity, and hence promoting the highest possible illuminating power of the Gas.**

THE AUTOMATIC GAS CONTROLLER

Is designed to occupy the place of the gas-burner. Within the circumference of a small cylinder, below the burner, is placed a conical valve, attached to a movable diaphragm, the valve and valve seat is proportioned, so that under a supply of Gas, varying in pressure from four-tenths to five inches, the burner will continue to produce the same consumption and development. The unerring accuracy of movement of the Diaphragm at every change of pressure, whether gradual or sudden, and its positive control of the valve which admits, by its proportionate increased or diminished aperture, the same unvarying amount of Gas, has elicited the unqualified approbation of engineers and other experts in the profession.

The simplicity of its construction, and materials used, are a sure guarantee of its durability and continued successful peration. They afford to the consumer of Gas the advantage of a **superior light, with the greatest possible economy**; and for the Gas Company, they control o the Street Lamps, affording a more satisfactory light for the public, without waste.

The public are invited to witness its operation, at the Office of the Company; and samples will be sent to Gas Companies for experiment, on applicatiou by letter or otherwise.

G. W. THOMPSON & CO.,

Office, 52 GREENE ST., (up stairs.)

A. L. BOGART, AGENT, 592 BROADWAY,

New York.

We are permitted to refer to the following Gentlemen, who have thoroughly examined our Gas Controller:

GEO. H. KITCHEN, Inspector of Gas Meters, 561 Broadway.
CHAS. ROOME, President Manhattan Gas Company.
J. H. ADAM, President New York Gas Company.
PETER COOPER, Cooper Institute.
JOHN A. DUFF, Olympic Theatre.

THE AMERICAN METER CO.,

Organized under the General Manufacturing Laws of the State of New York.

SAMUEL DOWN, PRESIDENT. HENRY CARTWRIGHT, VICE PRESIDENT. RICHARD MERRIFIELD, SECRETARY AND TREASURER.

TRUSTEES.

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy, and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

340 WEST TWENTY-SECOND STREET, NEW YORK,
ARCH AND TWENTY-SECOND STREETS, PHILADELPHIA,
1 BARRETT STREET, BOSTON, will meet with prompt attention.

STEAM-PUMPS.

WORTHINGTON'S STEAM PUMPS, extensively used by Gas-Light Companies. For Sale at greatly Reduced Prices.

Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.

Patent GATES, for Water and Steam-stops.

HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

WEST'S IMPROVED PUMPS, the most Simple, Durable, and Powerful, and the Cheapest in use.

J. D. WEST & CO.,
179 BROADWAY, N. Y.

GEO. H. KITCHEN & CO.,
NEW PATENT
GAS APPARATUS
For Country Residences, Public Buildings, &c.,
FROM $300 UPWARDS.
EVERY DESCRIPTION OF GAS FIXTURES.
Gas Fitting in all its branches.
561 Broadway,
NEW YORK.

TO GAS COMPANIES.

THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

CHAS. M. CRESSON,
Late Asst. Engineer of the Philadelphia Gas-works,
417 Walnut st., Philadelphia.

ANALYTICAL CHEMIST

C. ELTON BUCK,

Analytical and Consulting CHEMIST,

39 NASSAU STREET, NEW YORK,

Analyses of Ores, Minerals, Soils, Guanos, Coals, &c., and Tests of Commercial Articles, carefully and promptly made. Consultations may be had, and opinions given on Chemical questions. Samples for analysis from a distance, may be sent by mail or express, directed to the Laboratory as above.

GLYCERIN

FOR

Filling Wet Gas-Meters,

Cheaper than Whisky or any other substance.

We have furnished the Cincinnati Gas and Coke Company 800 barrels Glycerin, for filling their wet meters, and are now ready to supply other Gas Companies at the lowest cash prices.

We warrant our Glycerin not to corrode the meter metal, nor to freeze at the lowest ordinary temperature, nor to evaporate.

HARTMAN & LAIST,
Manufacturing Chemists,
Cincinnati, O.
Office 64 Sycamore.

NEW YORK FIRE-BRICK and Clay Retort Works. (Branch Works at Kreischerville, Staten Island.)

B. KREISCHER, office 56 Goerck street, corner Delancy street, New York.

GAS RETORTS, TILES and FIRE-BRICK of all shapes and sizes. FIRE MORTAR, CLAY, and SAND. Articles of every description made to order at the shortest notice. B. KREISCHER.

WOODEN PURIFYING TRAYS.

PATENT

Conically Slotted Solid Wood Sieves

FOR GAS PURIFIERS.

CAUTION

TO

GAS MANUFACTURERS.

The Conically Slotted Solid Wood Tray was patented 21st October, 1862, by N. O. Hawxhurst, assignee of Wm. Combe, and all persons are cautioned against purchasing such trays of R. G. Hunt, or any other person except the subscriber, as it is a direct infringment of said patent. The following companies are now using these trays.

Manhattan, New York,
Williamsburgh,
Brooklyn,
Albany,
Baltimore,
Philadelphia,
Chicago.
Louisville,
And numerous others.

Orders received by mail or otherwise.

JOHN L. CHEESMAN,
147 Ave. C, New York City.

Glycerin for Gas Meters.

This article is superior to any fluid ever before used for Wet Meters, and we cannot better set forth its advantages than by giving the following letter from the Superintendent of the Covington Gas Co. The superiority of our Glycerin over all others in the market, for this purpose, is admitted by every Company that has used it. We have sold, the past winter, to the Cincinnati Gas-Light and Coke Co.; to the Gas Companies of Covington, Ky.; Dayton, Springfield, Portsmouth, Urbana, and Piqua, Ohio Richmond, Ind., and Buffalo, N. Y, to whom we refer.

Glycerin is much cheaper than Whisky is now, or likely to be hereafter, and not evaporating, greatly increases the economy of its use.

OFFICE OF THE COVINGTON GAS-LIGHT CO.,
COVINGTON, KY., Feb. 18, 1864.

MESSRS. W. J. M. GORDON & CO.:

Dear Sirs,—It affords us great pleasure in testifying to the superiority of the Glycerin Fluid purchased from you for filling the Wet Meters now in use by the Covington Gas-Light Company.

The difficulty of finding a non-evaporating and anti-freezing mixture for Wet Meters, has, in my opinion, been overcome by the use of your Glycerin Fluid.

I have had it in constant use for the past four months, and during that period the thermometer has ranged as low as 14° below zero, and after careful examination, I have found the fluid in the same condition as when first put in the Meters, and without the slightest discoloration.

Its non-evaporating quality does away with the hitherto unavoidable expense of filling the Meters monthly, and renders Wet Meters no longer objectionable.

In fact, I can cheerfully recommend it as being cheaper and better than any other Fluid or Mixture now in use.

Very respectfully,
S. S. STRATTON, *Sup't Cov. Gas Co.*

We have been engaged in Manufacturing Glycerin the past six years, and from our advantage in material and the large amount we make, are enabled to offer it lower than any manufacturer in this country. We will be pleased to quote prices or to give further information.

W. J. M. GORDON & BRO.,
MANUFACTURING
CHEMISTS & DRUGGISTS,
N. E. Cor. Central Avenue & Eighth St.,
Laboratory, Miami Canal, bet. Third & Fifth Sts.,
CINCINNATI, O.

The most Useful Invention of the Age!
PATENT
COSMOPOLITAN FURNITURE PASTE!
FOR POLISHING AND RESTORING
Furniture, Pianos, Marbles, Carriages,
&c., &c.,
SUPERIOR TO VARNISH.
☞ *DRIES INSTANTANEOUSLY.* ☜

It brings out the grain of the wood in all its original beauty, and immediately after being applied, the article polished is perfectly dry, thus possessing a very great advantage over varnish or any kind of liquid polish.

It will keep in any climate, and is always ready for use.

ONE BOX IS SUFFICIENT TO RESTORE AN ENTIRE HOUSE OF FURNITURE.

Price 75 Cents per Box. . Double size $1.25.
Each package bears our trade mark.
A LIBERAL DISCOUNT TO DEALERS.
For sale Wholesale by
H. B. HERTS BROS.,
52 JOHN ST., N. Y.

BY ROYAL LETTERS PATENT.
HERT'S & CO'S
AMALGAMATED
ALUMINUM, ZINC AND PLATINA
PENS.
WARRANTED ANTI-CORROSIVE.

In introducing this invention, MESSRS. HERTS & Co. beg to call attention to the following advantages combined in these Pens:

They possess the Anti-corrosive properties of the Gold Pen.

The Freedom of the Quill, and

The Flexibility of the Steel Pen.

Thus *combining* in *themselves* every advantage found in other pens; and by their anti-corrosive properties entirely obviating all the objections hitherto existing against the use of Metallic Pens.

Another advantage peculiar to these Pens, is that they *improve* after being a *short time in use*, and may be left in the ink without fear of injury, as they *never need wiping*.

THE No. 808 "medium points," are adapted for *office use* and *general business purposes*.

THE No. 909 "extra fine points," are adapted for *Ledger, Heading, Posting, Engrossing, Ladies and School use*.

The undersigned have given HERTS & Co's Pens a trial, and are satisfied to recommend them to the general public.
FOWLER & WELLS.

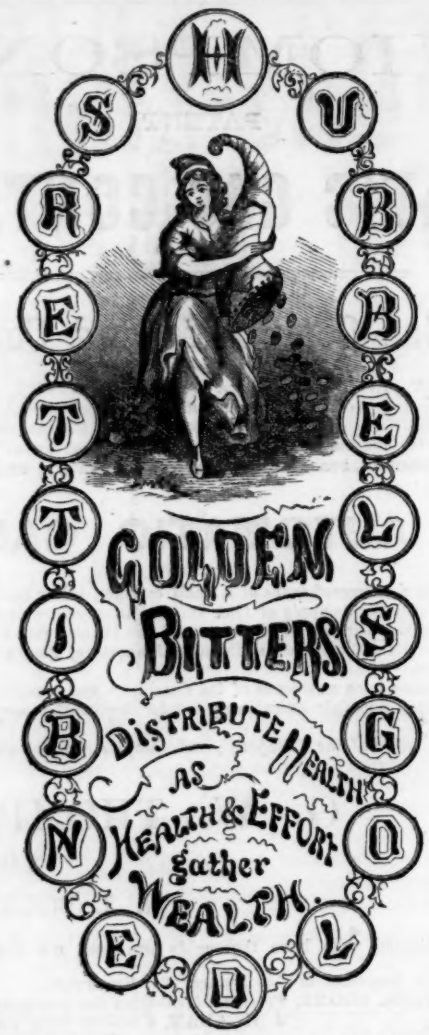
Manufactory, Bradford Works, Birmingham,
ENGLAND.

Orders for the United States, Canada, South America, and the West Indies, must be addressed to

H. B. HERTS, 52 John St, New York,
SOLE CONSIGNEE.

from whom samples may be obtained *gratis*, on application by mail or personally.

The Am. Advg. Agency, 389 Broadway, N. Y., will receive orders for the above-named Pens.



New York, April 18th, 1864.

* * * * * *

We respectfully invite your attention to and consideration of the justly celebrated and reliable remedy for DYSPEPSIA, HEARTBURN, DEBILITY and PROSTRATION. The Proprietors are proud to acknowledge the unparalleled success which has attended the sale of their valuable preparation, known in nearly every portion of the civilized world as the

"GOLDEN BITTERS."

We risk nothing when we term them a *valuable preparation*, for they are one of the few articles of the present day which are not a humbug; and we are willing and able to satisfy any person or persons who will call upon us, that the celebrated "GOLDEN BITTERS" are a genuine *bona-fide hygienic* article. It is the wish of the proprietors that the virtue of the article be tested before condemning. A decision of their merits by any one who has tried them, is worth a million of purchased bogus testimonials.

For Creating a Healthy Appetite

they are invaluable, and are unequalled as a TONIC. They are mild in their action, and operate by giving *vigor* and *strength* to the system,—not by any change they produce in the solids, but through the medium of the living principle.

They are Purely Vegetable,

being composed of Gentian Root, Calamus, Sassafras, and many other remedial agents of the Vegetable world, all preserved in Jamaica Rum and Sherry Wine.

As a Beverage

They are the most *wholesome, invigorating* and *palatable* stimulant ever offered to the public. And the fact of their being prepared chemically and scientifically, precludes the possibility of a bitter, unpleasant taste, common to Bitters generally offered for sale. We especially recommend them to LADIES, and particularly to those suffering from

DEBILITY, WEAKNESS, AND PROSTRATION.

Half a wine glass of these "Bitters" three or four times a day, will produce a remarkable healthy change in persons greatly debilitated.

The "Golden Bitters" have been tried and not found wanting. They are put up in our own *Patent* quart bottles, and for sale by Druggists, Grocers, &c., throughout the world. Each bottle bears a fac-simile of the signature of Hubbel & Co.

GEO. C. HUBBEL & CO., Sole Proprietors.
CENTRAL DEPOT, American Exp. Building, New York.

THE GOLDEN BITTERS.—We are not an advocate of stimulants of an alcoholic character; indeed we deprecate this "daily tonic" idea—this "morning toddy" which we see offered in all sorts of shapes as a recuperator, invigorator, revitalizer, &c. As a rule all artificial stimulants are dangerous remedies, and must be taken into the system as you would mercury or arsenic, in very small doses. But we have had an opportunity to try the now well-advertised article known as Hubbel's Golden Bitters, and are frank to say that where the system needs building up, where a stimulant is required to aid nature in restoring a lost appetite and infusing a vigorous action to the debilitated functions, we can recommend these Bitters. Hubbel's Golden Bitters are evidently intended to improve the debilitated human system, rather than to tickle the palate, and are, therefore a harmless and safe remedy to keep in the house.—*New York Weekly Day Book.*

YONKERS, May 9th, 1864.

MESSRS. GEO C. HUBBEL & CO.:

GENTS,—Having used only two bottles of your "Golden Bitters," I can recommend them with the utmost confidence as a Tonic, and particularly for a change of diet and water. It is as well for ladies and children, giving them part of a wine glass two or three times a day.

Yours respectfully,
GEORGE C. BARKER.

EAGLE GAS STOVE WORKS.

Cooking & Heating
BY GAS.

No Smoke! No Dirt! No Smell!

The "EAGLE" Gas Stoves

Will BOIL, BROIL, ROAST, BAKE, TOAST, STEW, and HEAT IRONS

☞ CHEAPER

THAN COAL OR WOOD.

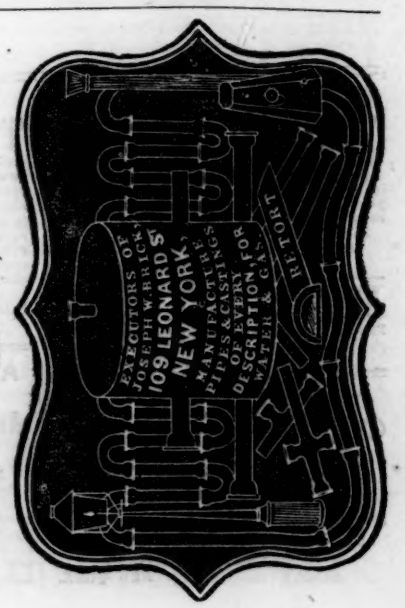
I have on hand and make to order STOVES and FURNACES for CHEMISTS, TINNERS, BOOKBINDERS, DENTISTS, TEA STORES, VULCANIZING STOVES, PHOTOGRAPHERS' OVENS, &c., and for TAILORS' and LAUNDRY IRONS.

Send for Descriptive Catalogue.

I ALSO MANUFACTURE

COAL OIL STOVES,

For Cooking and Heating.

H. D. BLAKE, *Sole Manufacturer,*
No. 474 BROADWAY, N. Y.

R. A. BRICK,
SUCCESSOR TO,